THE IRON AGE

THURSDAY, DECEMBER 11, 1902.

Alcohol Motors in Germany.

The recent agricultural fair at Halle, writes Consul-General Oliver J. D. Hughes from Coburg, has shown the wonderful strides that Germany has made within the last 18 months in alcohol motors. This is due to a great extent to the personal interest taken in the subject of the use and application of alcohol for trade purposes by the Emperor, and also to the low price at which this spirit for fuel purposes (containing about 90 per cent. of pure alcohol is furnished all over Germany—a quart costing only about 5 cents.

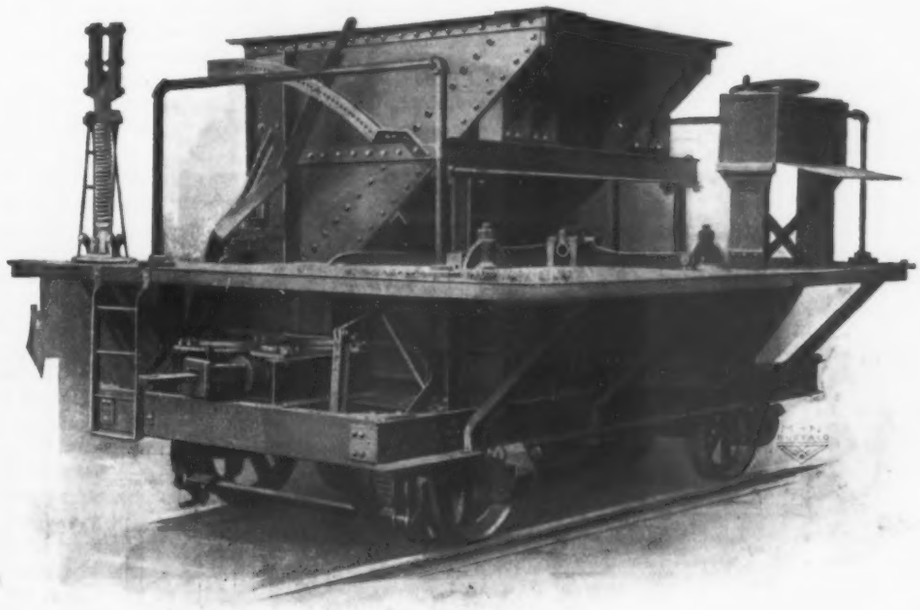
The great advantages of a spirit motor over the ordinary steam engine are that it is always ready for use, without preliminary warming up; it can be filled, oiled and started in from two to three minutes; there is no constant supplying of coal and water, and no danger of fire or explosion; no permits are required from Government authorities, and there is no compulsory inspection; the spirit is easily obtainable in all districts; there is no smoke or smell; and the weight of a portable spirit motor is about one-half that of a portable steam engine of equal power.

With regard to cost, a large German firm that exhibited at Halle showed 6 to 8 horse-power portable alcohol motors for $973.30; 10 to 12 horse-power motors for $1265.29, and 16 to 20 horse-power motors for $1581.61. In the tests made, one trial showed a consumption of 0.92 pounds of 86 per cent. spirit and 0.81 pounds of a mixture of one-fifth benzol and four-fifths 86 per cent. spirit, in both cases per brake horse-power per hour.

The Jones & Laughlin Steel Company.—The annual reunion of the selling agents of the Jones & Laughlin Steel Company of Pittsburgh was held in that city on December 1 and 2. The agents who took part in the reunion are as follows: D. M. Barker, Chicago; George Kinsey, Cincinnati; George C. Beals, Buffalo; H. F. Holloway, New York; F. A. Goodrich, St. Louis; J. C. McLaughlin, Detroit; J. B. Newkirk, Philadelphia; W. F. Bonnell, Cleveland, and A. B. Marble, Boston. On Monday a trip was taken up the Monongahela River in a pleasure boat, the "Vesta," owned by the Jones & Laughlin Steel Company. In the evening the party went to the theater. On Tuesday forenoon the American Iron & Steel Works of the company on the South Side, Pittsburgh, were inspected. Tuesday afternoon was devoted to business, and on Tuesday evening a smoker was given at the Pittsburgh Club for the agents.

The Treadwell Ore Charging Scale Car.

We here present several views of a specially constructed ore charging scale car, familiarly known as an ore larry car, built at the Lebanon Works of M. H. Treadwell & Co., 95 Liberty street, New York. The car is operated on a track directly in front of the stock bins, where it is charged and weighed automatically, either in part or as a whole, before the load is delivered to the skip car.



THE TREADWELL ORE CHARGING SCALE CAR.

The special feature is found in the five-beam standard Fairbanks scale, the arrangement of which is shown in the sectional views, Figs. 2 and 3. The metal beam box is located at the side of the platform and is at all times easily accessible. The propelling power is derived from two 30 horse-power Westinghouse motors, secured to the under frame and geared directly to the axles, which are carried by wheels 30 inches in diameter. A Westinghouse controller is placed on the platform. The current is supplied from overhead trolley wires.

To release the charge in the hopper the lever shown at the end is operated to open the hopper door, when the stock slides out. Since the sides of the hopper are inclined the material has no tendency to stick in the corners, so that the entire load is dumped at the side of the car and clear of the track.

The car is of extra heavy steel construction, the hopper being of steel plate and having a bottom sloping at an angle of 45 degrees. The door extends the full width of the hopper and can be raised gradually, or instantly, the full opening. The body of the car is made

of standard steel shapes, suitably braced to resist all shock, and is surmounted by the operator's platform. The bearings are brass and the wheels chilled cast iron.

The use of these cars is becoming more and more general, several have been installed at some of the large blast furnaces of the United States Steel Company. They are built of any gauge and capacity. The one illustrated is of standard gauge, has a capacity of 7 tons and weighs, loaded, 12½ tons.

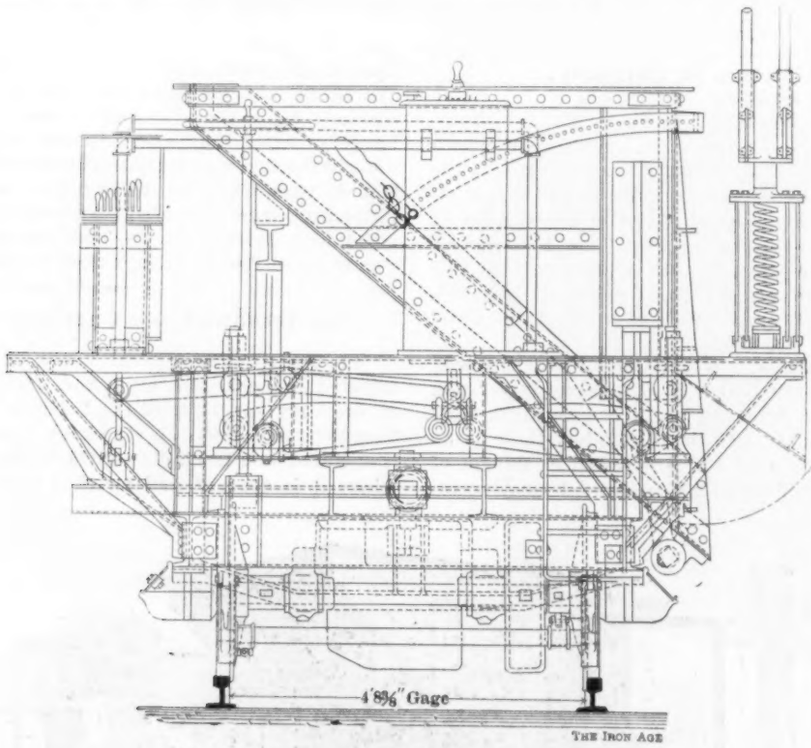


Fig. 2.—End Sectional Elevation.

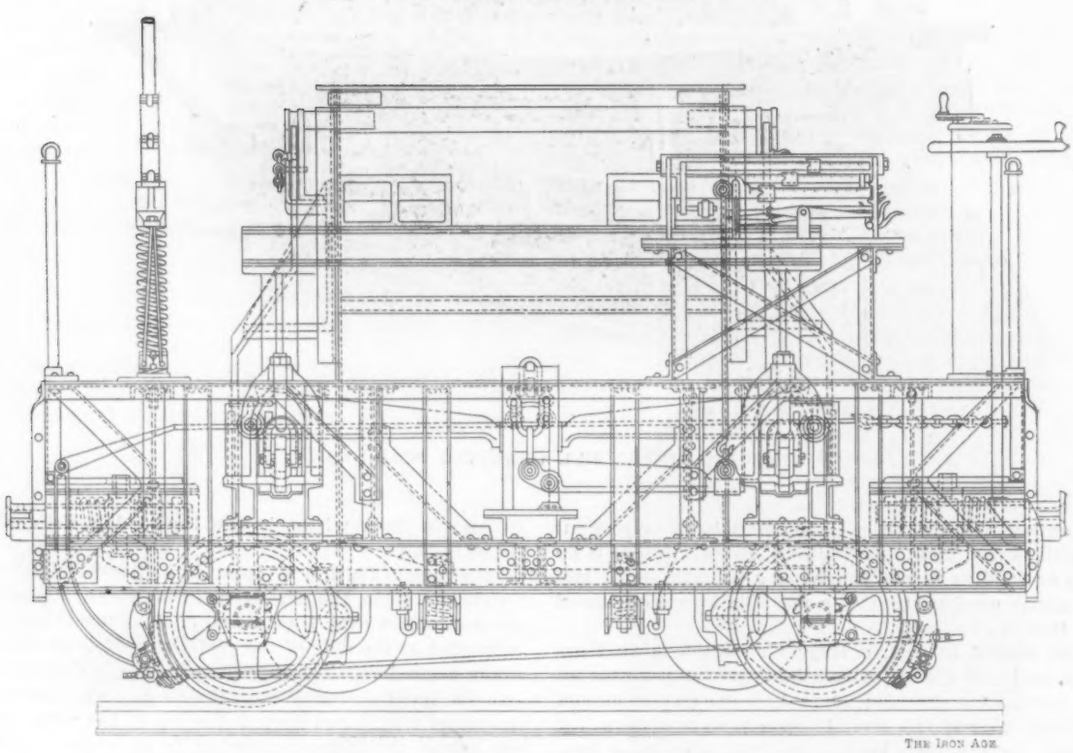


Fig. 3.—Side Sectional Elevation.

THE TREADWELL ORE CHARGING SCALE CAR.

The largest carbon ever encountered in Brazil was found in the Lençoes district in 1895 on the ledge of a mountain which had been worked some time before. It weighed 3150 carats, and was purchased from the miner for 80,000 milreis (at that time $16,000), one-fourth of the price going to the owner of the claim upon which it was found. This stone frequently changed hands, and was finally purchased by an exporter of Bahia for 121,000 milreis (then $25,400) and was shipped to Paris, where it was broken up into marketable pieces. The next big find was in 1901, upon another claim of the same lessee. The carbon weighed 577 carats, and was sold by the miner for 79,000 milreis (then $17,380), one-fourth part going to the lessee. The average size of the carbons encountered is six carats.

Recollections of the Early Days of the High Speed Engine Industry.*

BY JOHN E. SWEET, SYRACUSE, N. Y.

The Porter Engine.

In 1862 Charles T. Porter exhibited at the International Exhibition, London, an 8 x 24 inch engine running at what seemed then a fearful speed, 150 revolutions per minute. This was afterward set up in London and ran 225 revolutions. While I was there and saw this engine in the exhibition of 1862, my mind was occupied in other directions, and I paid very little attention to it. I did, however, see Mr. Porter, and copied for him the drawings of the Richards indicator on parchment for his patent attorney. I became acquainted with Mr. Porter later at the Paris Exposition of 1867, where he exhibited four high speed engines and a model, all built by Whitworth of Manchester. Two of the engines ran dynamos, the first I had ever seen; I do not remember whether direct connected or not; the other engines were, one a 12 x 24 inch, running 200 turns a minute, driving a part of the English machinery, and the other a 6 x 12 inch, running 750 revolutions idle, I believe, though it met with an accident or rather broke its own connecting rod by simply throwing it in two, due, no doubt, to a defective weld. I think 400 revolutions was about its normal speed. The model of the engine, a complete 6 x 12 inch, was split directly through the cylinder, which was to me a wonderful thing. From what I know now I do not believe that any such pieces of workmanship as these engines were could have been made at that time in any engine shop in this country, and I say this in the full consciousness of the fact that Corliss had a silver plated engine in the exhibition at the same time.

Mr. Corliss received a gold medal, a fact thoroughly well advertised throughout this country; as did also Mr. Porter and a half dozen others, which was not so well known.

Mr. Porter's engines shown at Paris had the same bed designed by him in 1863, a design that has been copied more, except the Corliss, and lived longer unchanged, likely, than any other, and though it has been copied, imitated, changed, modified and counterfeited by others, it has never been improved upon. Tangye Brothers of Birmingham, England, adopted a modified form of it years afterward, and whoever is making a bed of that character is indebted to Charles T. Porter and not to Tangye Brothers.

I do not remember just when, but think at this time, that Mr. Porter explained to me his conception of a marine governor, which as I now remember was simply forestalling what we are all using, a spring to resist the centrifugal force of the governor balls, instead of as had, so far as I know, always been done before by gravity. This resisting the centrifugal force of the governor ball by a spring instead of gravity means a good deal more than at first sight would appear. Centrifugal force increases directly as the radius of rotation, and a spring's resistance increases in a direct ratio also, which renders it easy to establish a delicate state of equilibrium in all positions of the governor ball; whereas with gravity, which remains constant, the pendulum arms have but one position when they are just right, and give a very small range of good results.

Mr. Porter did more, he introduced refined workmanship in engine building in this country—the first I believe to make mechanically fitted valves on flat planes, introduced the better indicator, and did, besides, a great amount of scientific work, original and valuable to all who have made the nature of heat engines a study; and in passing I may say one thing more—no man, unless it was Zera Colburn, has to my mind ever been able to write on mechanical subjects and make his thoughts so clear and use such admirable language as Charles T. Porter.

Along in the early seventies the business of the Porter-Allen Engine Company was started in Harlem, and met with disaster, owing to a combination of adverse circumstances. The engine was later built by the Hewes & Phillips Company of Newark, and since by the Southwark Foundry & Machine Company. It is likely that the Porter-Allen has had as few changes in its mechanism since its first completed form as any, with the possible exception of the Buckeye. Corliss, it will be remembered, modified his design just before he died, and it then had what seems to us now a long life without change; but I doubt if as long as the Porter-Allen, now nearly 40 years.

The Buckeye Engine.

The first I ever saw of the Buckeye engine was at the Centennial in 1876, when a standard slow speed and a small high speed engine, such as they had been building for 20 years and coupling direct to circular saw mills, were exhibited. The small engine ran at a fearful speed. I understand they ran 500 or 600, but the service was rather favorable for high speed, as they ran light during the return of the carriage, and, too, there was no governor to bother with; the engine being run by the throttle, which reduced the mechanism to its fewest parts. In this connection I cannot do better than to quote the following from J. W. Thompson, the inventor:

> Very high speed engines directly driving mulay saws were built in the 40s, but the days of counters were not yet, so the actual speeds attained will never be known; but I am very sure of having seen speeds exceeding 400 frequently and sometimes near 500, but the generality of rural saw mill men seldom exceeded 300 revolutions. These engines were built by Sharp Brothers previous to 1850. The firm of Sharps, Davis & Bonsall were organized in December, 1851, and as soon as large circular saws came into use they were attached direct, and I am tolerably sure that a speed of 600 was frequently reached. The engines were all throttling, run without governors, the sawyer having the throttle at his hand constantly and admitting steam as required. For quickness of control butterfly valves were used, absolute tightness of closure not being necessary, as a stop valve was provided for stoppage when required.
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> No automatics were built here until the formation of the Buckeye Engine Company, but very high speed engines had their drawbacks. I have frequently seen worn out crank pins, the worn out part on the inner side so nearly central with the crank line as to show that about nine-tenths of the wearing strain was due to the momentum of the reciprocating parts. On the outer side of the pin a strip of the original shop finish mostly remained visible after one-eighth or more had been worn off the inner or shaftward side. Yet every device was used to lighten the parts, even to making basswood pitmans surrounded with light straps, but when the saws were not kept in best order the stress mostly greatly exceeded the "factor of safety." The wooden pitmans were soon abandoned with the advent of the circular saw, but nothing but wooden pitmans were ever used here to connect the saw to its crank.

The large engine was, as it is now, a shaft governed engine, and so far as I can recollect, practically like their present standard machine, but is not high speed.

Some years before the Centennial B. W. Payne & Son were, I heard, building shaft governed engines, as were also Hall & Whitmore of Havana, N. Y., but not particularly high speed, as I remember them.

The Straight Line Engine.

The first Straight Line engine was built in 1872, purely to try a lot of experiments. I was well aware of the fact that in general it is not good practice to try two experiments at one time, but this was a different thing. To tell whether a long piston was better than a short one did not interfere with trying to find out whether a solid box was the thing for an engine main bearing, and these were the sort of experiments that were coupled together. It is doubtful if ever more departures were made in any standard machine than were in that conglomeration of mechanism: Casting the frame with the cylinder; making the frames straight and resting the whole on three points, with one unfastened; casting the jacket on the cylinder, with solid cast iron boxes and ring oilers; putting the fly wheels on the throws of the center crank and building the whole up, which was then new, and thus putting the fly wheels between the frames; using a long piston, one equal to the diameter of cylinder, secured to the rod in a new way (fastening the end in the cross head by a half nut); piston and valve rods running through solid round holes; a cross head so long and guides so short that the two were of the same length; a cross head pin tight in the connecting rod and with two bearings in the cross head; connect-

* A paper read before the Engine Builders' Association of the United States.

ing rod of steel casting, half of the box cast on, oiled through the crank pin and a different method of oiling the guides. A single valve of the Porter-Allen type performed all the functions of a slide or piston valve. All the pivots, except the crank taper joints, had take ups endwise. There was a novel governor of the fly ball pattern, in which the ball travels in an elliptical curve, which more nearly conforms to the parabola which had been determined to be the true form.

In the old days, which likely many of you do not remember, there was about as much high science spread over the fly ball governor as there has been in recent years over the shaft governor, and it came to an end about 1880 on the Cosine governor, about which there was a great ado in foreign publications. This Cosine governor was nothing more than the governor on the first Straight Line engine, scientifically developed rather than being made by hand. The governor controlled a sliding block in a link and varied the cut off. The engine ran, off and on, for a number of years, and in a dozen different places as a helper in emergencies, ending up as the central figure in the Straight Line Engine Works.

The experiment proved a good many things; about as many things that would not work as would. The long piston was a miss and a go. When they did not get to cutting they went awfully nice, but they were more likely to cut than the short ones, or at least that seemed to be the conclusion.

The rods through round holes proved successful when we found how to make the holes. The taper cross head pin would not do, but the long cross head and short guides were right. They were made straight, and never wore out of straight; in fact, never wore much anyway, and this, with the many other experiments I have tried, has established the fact that things which do not tend to wear out of truth do not wear rapidly. The oiling of the cross head was a failure; that of the crank a success. The solid boxes were right in one respect and wrong in another, and led to a compromise that was better. The frame and wheels within the frame was right and the governor all wrong. The valve, as then made, was wrong, but made so successfully later as to be what it is known to-day.

The Shaft Governor.

Between the time this experimental engine was built and the one built in the work shop of Cornell University and shown at Philadelphia the shaft governor with shifting eccentric began to take on shape. I had heard about it and had seen the Hall & Whitmore engine, but none with a shifting eccentric; but so built the engine shown at the Centennial, where I first saw the Hoadley portable which also had a shifting eccentric and shaft governor, the Buckeye being, as was the Hall & Whitmore, a governor rotating the eccentric around the shaft controlling a cut off only.

It may be proper to remark that the Cornell engine was belted to the first Gramm dynamo ever built in this country, which was also built at Cornell, the Gramm dynamo being the father of all direct current dynamos; and the three elements, an engine, dynamo and electric lights combined, was the first shown in this country at an exhibition I believe.

The governor of this engine shifted the eccentric by wedging it over by rotating a short piece of a primary eccentric in a way similar to the Armington & Sims plan, and it operated the dog leg rocker arm, which gave a constant lead at both ends of the cylinder. This was one of the many ingenious inventions that did not need to be made. At the time it was made it was supposed and so stated that with a shifting eccentric a constant lead could not be obtained, and that was the objection to the shifting eccentric.

A good many designers have thought that the trouble was due to the fact that the eccentric moved on the arc of a circle instead of going in a straight line, but that has nothing to do with it. The distorted rocker arm corrected the lead, but, as said above, that was not wanted. Soon after going into the business we found that out, and the variable lead was adopted about 1882.

Until 1880, as I remember it, the Porter-Allen Engine Company were the only one making a business of building high speed engines, and they were neither center crank, single valve nor shaft governed, as are the most of the engines built by members of our association. The B. W. Payne Company had been building shaft governed, center crank and piston valve engines for a year or two, but not exclusively, and somewhere about this time the Hall & Whitmore people went out of business, as had also Mr. Hoadley.

The three Straight Line engines built before and during 1879 were more or less experimental. In the autumn of that year building was started as a business in a small way. The first engine set to run a dynamo regularly was in 1881, and the incidents connected with it are appropriate to record, because while it is known that the electric light business helped to build up the engine business, it is not generally known to what extent the high speed engine helped the dynamo business. The electric light people were at this time building only arc light machines, and they were having a good deal of trouble in the flicker and unsteadiness of their lights, and the excuse was that the engines did not govern and that if they could only get an engine that would govern the lights would be all right. When this engine was set up in the Brush Works at Cleveland a 40-light dynamo was belted to it, with the full load thrown on and off, and Mr. Brush, after experimenting an hour or two, decided that the speed varied one-half turn a minute when the load was off and on, nor was there the least evidence of racing. This settled the question of an engine's governing, and disclosed the fact that the trouble, if any remained, was elsewhere. I mention this because this was before good governing had begun to be talked about, and there has been no change since, so far as the principle of its action is concerned.

The governor designed by Mr. Porter to control the link block in the Allen engine is still in use on the engine; largely in use in Europe in various styles of engines, and is used by some other builders, who designate it as a central weight governor, though it's a Porter invention, nevertheless.

Just how perfect the Porter governor acts compared to the shaft governor I do not know, but that it was a great stride over the old form of pendulum governors is unquestioned. It being belt driven, however, it likely is less prompt on sudden changes than the shaft governor, but in remembering the slipping of governor belts we do not want to forget the sticking of governor pins.

Having gone rather extendedly into the history of Mr. Porter's, the Buckeye and my own work, it is in order to follow Mr. Hoadley and Gardiner C. Sims, who were working together at the same time I was, but at first on a little different line.

The Work of Hoadley and Sims.

Mr. Hoadley's exhibits at the Centennial, where I first met him and Mr. Sims, as well as the Buckeye people, were portable engines, with the exception of the little one, not running, and which he called his Meerschaum, because of its resemblance to a pipe, and which he later designated the Chronometer, because it was made to run in all positions. His portables were center crank, shaft governed with shifting eccentric, single valve. His governor was quite unlike our modern practice, having two double elliptic springs, practically like carriage springs, to resist the centrifugal force of the weights, and some peculiar lever arrangements which I cannot describe.

Mr. Hoadley's original patents on the governor went back to 1872; though that as a shaft governor was antedated by various other shaft governor patents, it carried a new form and was father to others that have appeared as original.

In Mr. Hoadley's work Gardiner C. Sims was a coworker, and just how much credit is due each one would no doubt have been hard for either of them to say.

Of the early builders of shaft governed engines in this country, Mr. Hoadley's patent of 1873 probably is first, and I believe this engine, started on April 1, 1873, the very day I started my first engine, was the first shaft governed engine ever run in this country—that is,

as a business proposition. It is more than likely that other inventors may have experimented before, but it seems no one in this country who continued in business anticipated Hoadley and Sims' work. Their work, however, in the early days was not just what we are now considering—that is, the center crank shaft governed high speed engine. The Cornell engine exhibited at the Centennial in 1876, built in 1875, seems to have been as early as any.

Other Engines.

B. W. Payne & Son exhibited their first engine in the showroom of the American Electrical Company in New York in 1879, with the Tabor governor; Armington & Sims their first engine at the Paris Electrical Exhibition in 1881 direct connected to an Edison Jumbo dynamo, using the same governor up to the present time, I believe.

The Westinghouse engine was first built for direct connection to a dynamo for locomotive head light; in 1882 three were built, with shaft governor outside, and in 1883 their first standard engine was put on the market.

The first Ide engine was built in the latter part of 1882 and one exhibited at the Railway Exhibition in Chicago in May, 1883. This engine had a single ball governor, but when I advised Mr. Ide that I had a patent that covered this form he at once acknowledged the claim and abandoned that form for a time, but later, after using the two-ball governor, he found it worked just as well with one as two, and so simply left one of the balls off. The question whether he had or had not the right to do that was very nice, and might have been a rich one for the lawyers.

The Ball engine was brought out in 1883, and the first one shown at the Mechanics' Institute Fair in Boston in the fall of 1883. The Ball governor was not only a shaft governor, but was also fitted with a band wheel loose on the shaft, which acted to turn on more steam as the load increased. This was abandoned later for another form, and still later for another.

The governor which weighs the load and the inertia governor deal with a variation on steam pressure precisely as others, and as all meet all reasonable demands, then the most simple, reliable, durable and easiest of adjustment is to be preferred.

Many concerns building similar engines have come into existence since 1883, and many gone out—too many to schedule in this paper.

S. V. Huber on Dusseldorf Exhibits.—S. V. Huber, consulting engineer, Ferguson Building, Pittsburgh, has returned from a two months' trip to Europe. Mr. Huber's purpose was primarily to visit the Düsseldorf Exposition. He states that he was very much impressed with the exhibit at this exposition of the German machinery manufacturers. It was especially notable for the large amount of rolling mill machinery shown. Complete roll trains for both rails and merchant material were in operation, but no steel was actually rolled. There were also two universal mills in action. The variety of machines was greater than at any previous exposition. Of especial interest were a number of the newest types of gas blowing engines, designed to use the gas from blast furnaces, and through which great economies are possible. To add to the effectiveness of the gas blowing engines gas washers have been constructed, of which several types were shown. These extract the dust from the gas as it comes from the blast furnace and prevent the engines from becoming choked up. The German and French manufacturers are devoting a great deal of attention to producing gas engines of high power. Many of them are building single engines of 1000 and 1200 horse-power. There were also some very large hoisting engines for mines and pumping machinery, both steam and electrically driven. In the construction of machine tools the advance of the German manufacturers has been especially notable. At the present time many of the English steel plants and machine shops are being remodeled after the newest German plants.

Foreign Steamship Companies Cannot Store Machinery Duty Free.

WASHINGTON, D. C., December 9, 1902.—The Attorney-General has rendered an important opinion with regard to the right of foreign steamship companies to bring into the United States, duty free, spare parts of machinery to be stored in this country for use in emergencies that may arise. The Attorney-General holds that if such spare parts are actually landed they are liable to duty, and that the only exception to be made is in case such parts are brought over to meet an emergency which has already arisen and are transferred from one vessel to another without landing.

The case upon which the opinion has been delivered arose upon an application from the Cunard Steamship Company asking leave to land a steel shaft without payment of duty, to be kept on the company's dock at New York for use on the steamships "Umbria" or "Etruria" in case of emergency. The application stated that the vessels were single-screw sister ships, for which extra shafts are kept on hand at the home port as part of the equipment for use in case of accident. Reference was made to the recent detention of the "Umbria" at New York for the shipment of a spare shaft from abroad, and it was stated that the shaft in question which it was desired to bring over on one of the two vessels was "not intended for sale or consumption in this country, but for special use on board of either steamship." In support of this application a decision of the Treasury Department dated February 24, 1899, was cited in which the Department permitted a piece of machinery known as a "screw boss" to be brought into the harbor of New York by a vessel of the North German Lloyd Line for the purpose of replacing a defective piece on a sister ship. In that case the Attorney-General said:

> I am disposed to regard this duplicate piece of machinery not as an article imported from a foreign country and subject to duties under our custom law, but as a part of the equipment regularly provided for and belonging to the steamship "Kaiser Wilhelm," which you may permit to be delivered to it by its sister ship without the payment of duty.

The case presented by the Cunard Steamship Company was submitted to the Attorney-General for an expression of his opinion, which has been delivered to the Secretary of the Treasury, as follows:

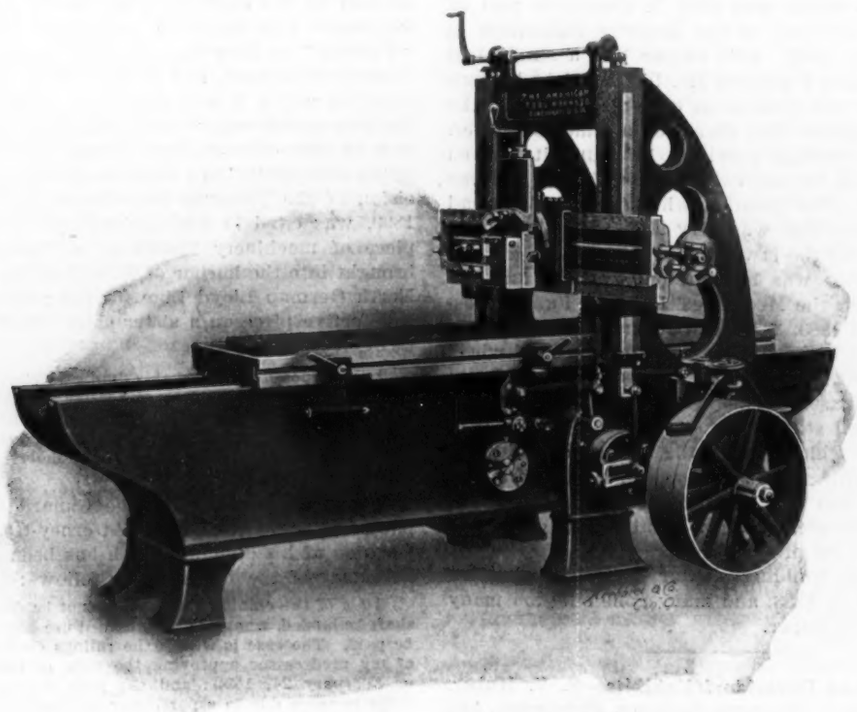
> I am of the opinion that this cannot be done, and that if the shaft be landed, whatever its intended use may be, the duty must be paid. The case is within the rulings cited by you, save that of my predecessor approving the view of the Solicitor-General of February 24, 1899: and the view there expressed was in large measure due to a particular state of facts which does not prevail in the present case.
>
> The material differences between that case and the one under consideration are that there the article was made in duplicate at the time and as part of the original equipment, was intended for immediate use in "relieving a disabled ship of a friendly nation detained in one of our ports for repair," was not actually landed, but was transferred from one vessel to another in the harbor. Here the shaft is one of a number kept on hand at the home port as part of the original equipment, is needed for no emergency, but is intended to be landed and kept on the dock for possible use in case such emergency should arise. But whether these differences be vital or not, the somewhat liberal construction in the opinion referred to is not to be extended beyond the facts of the particular case then under consideration.

The Secretary of the Treasury, in accordance with the above opinion, has notified the Cunard Steamship Company that the views of the Attorney-General are adopted by the Department and that the application must therefore be denied. W. L. C.

Under the advanced freight rates for iron and steel, which are to go into effect January 1, the rates between short haul points will be based on a 1-cent advance per 100 pounds between Cleveland and Pittsburgh. The new rate for carloads for iron and steel articles between Youngstown and Cleveland and Youngstown and Pittsburgh will be 4¾ cents, and on less than carloads 5 cents, instead of the present rates of 4¼ and 4½ cents. The advance on pig iron, billets and articles taking the same rate, between Youngstown and Pittsburgh and Youngstown and Cleveland, will be 10 cents a ton.

New American Tool Works Planer.

The new 24-inch planer brought out by the American Tool Works Company of Cincinnati is here illustrated. The bed is very deep and unusually long, giving the table almost a full bearing when planing at extreme length. The V's are wide, with oil pockets at short intervals, insuring perfect lubrication to the table at all times. The housings are of box form with very wide face. The cross rail is well supported on the back and securely bolted to the housings. It can be raised or lowered from either side of the machine. The table is heavy and has T slots planed its entire length. The head has a firm bearing on the cross rail, and has automatic cross, vertical and angular feeds. An improved shifting device removes one belt from the tight pulley before the other engages it, thus doing away with all disagreeable shrieking of belts. The table reverses without shock or jar, and returns at a speed of 4 to 1. The back dog is so arranged that the table may be run from under the tool for examination of work, and is provided with rollers to avoid the wearing caused by the constant rubbing which usually takes places at this point. The bull wheel is stationary on its shaft, which revolves in long bearings of large diameter. This construction obviates the difficulty of running the table back to oil the bull wheel, as is necessary where it runs loose on the shaft. The driving shafts are made of special hammered steel, and each shaft, with all its parts, can be easily removed when necessary. The line of planers built by this company runs from 22 inches to 36 inches square.



NEW AMERICAN TOOL WORKS PLANER.

The Ohio Works of the National Steel Company.

A recent issue of *Industries*, published at Youngstown, Ohio, contained an interesting article on the Ohio Works of the National Steel Company at Youngstown, as follows:

Statistics obtained last week, setting forth the volume of business done in periods past, consumption and production, &c., are extremely interesting and go to show what is being accomplished at the big plant, at the head of which are Thomas McDonald, general superintendent; Joseph McDonald, assistant, and J. Horace Streeter, chief of the clerical forces.

The plant was placed in operation by the Ohio Steel Company in February, 1895, and was taken over by the National Steel Company four years later. Its product is rails, billets, sheet and tin bars and pig iron. From February 4, 1895, to November 1, 1902, the total output was 2,792,410 tons. From February 14, 1900, when the first of the three furnaces was lighted, to November 1, 1902, 1,161,374 tons of pig iron were produced, averaging 500 tons per day. Excavations have been begun for No. 4 stack, and it is apparent that the fifth is necessary and will in all probability be added. A recent improvement ordered is an ore unloader, which will be built by the Webster, Camp & Lane Company, Akron, Ohio, to replace the present one, which has proved too small.

In the finishing department the best record, when the plant was on tin bars, was made on January 22 of the present year, 2469 tons having been rolled. The month's output was 56,680 tons. When on rails the best day's work was accomplished on October 7, 1902, when 2220 tons were rolled, a small portion of this being tin bars. October proved also the best month's work while on rails, 50,420 tons of rails and 4506 tons of billets having been turned out, a total of 54,926 tons. The single furnace day's record was reached on December 10, 1901, when No. 2 stack blew 806 tons. In January of this year the same furnace established a world's record for a single furnace, when 19,645 tons were turned out, but which was outdone the following month by No. 1 in blowing 19,734 tons. The best day's run for the three stacks combined was 1973 tons on January 19, 1902. In the converting department, two 10-ton converters, the day's record was made on January 22, 1902, when 275 heats of 2780 tons were blown. October, 1902, was the best month, 66,378 tons.

In 1901 inbound cars were 67,878 loads, 12,930 empties, a total of 80,808, averaging 221 daily. Outbound cars, loads, 21,076; empties, 59,363; total, 80,439; daily average, 220. Materials received in 1901, including metal, ore, coal, coke, limestone, all equipments and supplies, 1,905,588 tons; materials shipped, including rails, billets, tin and sheet bar and metal, 533,165 tons. The present year will be the largest year's business in the history of the plant. The receipts of material to November 1 amounted to 1,969,961 tons, the shipments to 502,209 tons, the shipments for the best previous year being 459,700 tons in 1899 and 459,616 tons in 1901. The ten months of this year have surpassed the entire 12 months of last year. The plant is now on rails.

Scientific and Technical Notes.

Dispatches from Budapest announce that further improvements have been made in the Pollak-Virag system of rapid telegraphy. Telegrams are now transmitted from Presburg to Budapest, over a single wire, at the rate of from 50,000 to 70,000 words an hour. A Vienna paper describes a dispatch which it received by this process. It consisted of a strip of stiff parchment like paper, bearing 230 words. There was an ordinary dash between the words, which were easily read. The message occupied 15 seconds in transmission.

On the Zossen-Berlin experimental high speed electric railway has recently been placed a 76-ton electric locomotive, which takes its power from the three-phase wires at the full line pressure of 10,000 volts and applies this direct to the motors, without the interposition of transformers. The reason for thus discarding transformers was to reduce weight and save the wear and tear on the roadbed, as well as to facilitate starting. The previous car weighed 96 tons and reached a speed of nearly 100 miles per hour.

According to statistics issued by the inland revenue authorities of France the number of automobiles in that country is 5386, of which 2893 are cars with accommodations for more than two passengers, and 2493 are for one or two only. Paris alone has 1149, or about one-fifth of the total, 751 being cars designed for carrying more than two persons each.

The great Passasiachic Falls, near Ocampo, State of Chihuahua, Mexico, are to be used to generate electrical power for an extensive railway and milling and mining scheme. The falls are situated in the midst of one of the richest and most extensive mining regions in Mexico, and, having a sheer drop over a precipice of 1800 feet (ten times the hight of Niagara Falls), it will not be a difficult engineering task to utilize this power for covering all the requirements of the region. An electric railway for handling ore and materials will be built between the town of Minica, at the terminus of the Chihuahua & Pacific Railway, and the mining camps near Ocampo.

A form of guy anchor for holding in position poles carrying electric wires is designed like a screw, so that it can be placed in position without digging, filling or tamping; thus no disturbance of the ground is effected, and a tremendous load can be placed on the anchor without displacing it. Actual tests with a 5-inch (disk diameter) anchor showed that a pull of 8000 pounds was necessary to draw it from its position in a 3-foot hole in sandy soil; which pull is 3000 pounds greater than the breaking strain of the size of guy usually attached to this size of anchor. A 12-inch anchor withstood a pull of 36,000 pounds when bored into 5 feet of clay.

The Swedish Government has decided to convert the 4200 miles of Government owned railway into electric traction systems, for the purpose of utilizing the natural water power of the country. Representatives of the Government were lately in London, conferring with American experts with regard to details of the scheme. The work will be completed late in 1905.

The Wachusett Dam, at Clinton, Mass., for the Boston Metropolitan Water Works, is progressing steadily. Rubble masonry in the main part of the dam is being laid by ten derricks, having a combined capacity of about 500 cubic yards of masonry per day. These derricks are of the stiff leg type, fitted with large bull wheels and operated by compressed air. Each is self contained and can be lifted bodily by the Lidgerwood cableways employed and set in a new position, from time to time, as required by the progress of the masonry.

Construction on the Louisiana Purchase Exposition grounds is making good progress, according to a recent report of Director of Works Taylor. Of the nine buildings which are to form the main group of the fair, seven are in course of erection. The Manufactures Building has recently been contracted for, and the Transportation Building, it is anticipated, will be put under construction very shortly. There are now about 8½ miles of railway and spur tracks on the grounds. In connection with the landscape work 127 large trees, from 9 to 16 inches in diameter, were transplanted, and all but eight or ten of them have grown remarkably well.

A new 16 and 40 x 48 inch cross compound Corliss engine in the Atlantic Mills, Providence, R. I., has shown remarkably economical results in a recent test. The engine was run under three sets of conditions: 1, with cylinder jackets and reheater coil shut off; 2, with jackets and coil in service; 3, with jackets shut off and reheater coil on. In each case the run was four hours long, and the horse-power indicated was within one unit of 566; the results are thus fairly comparable. The steam pressure used was about 170 pounds, gauge, and the steam was superheated 40 or 45 degrees F. The cut off varied from 24.4 to 28.5 per cent. Revolutions numbered 80 per minute. In case (1) the consumption of steam per indicated horse-power per hour was 11.293 pounds, all of which, of course, was used in producing the mechanical energy developed; in case (2) the consumption was 11.406 pounds, of which 1.541 pounds were used in the jackets and the reheater coil, leaving 9.865 pounds used in the cylinders themselves; in case (3) the consumption was 11.220 pounds, of which 1.158 was used for reheating, and 10.062 for producing mechanical energy. A separate test was made, at 533 indicated horse-power, to determine the coal consumption, which figured out at 1.229 pounds per indicated horse-power. It appears that the best results were obtained when the cylinder jackets were shut off and the reheater coil was in use, though nearly equivalent results were obtained when all of these heating devices were discarded.

The world renowned Comstock lode of Nevada was for a long time virtually idle, due to the excessive cost and difficulty of obtaining power to keep the various levels free from water. A limited power supply was maintained by water brought along a flume 40 miles long. A recent power installation here consists of electrical units supplied by electricity generated at Floriston, Cal., 30 miles away. The prime movers are two horizontal turbines of 1400 horse-power each, at 400 revolutions per minute, and under a head of 85 feet of water. These are direct connected to Westinghouse three-phase alternators of 750 kw. at 500 volts. Three step up transformers raise the pressure to 22,000 volts, at which tension it is transmitted to its destination. The conductors were so designed as to produce a drop of not more than 10 per cent. in pressure fro mone terminal to the other under the maximum load. At the substation in Virginia City the pressure is reduced to 2200 volts, at which it is distributed to the mines; here a further reduction to 450 volts occurs. In all cases alternating current induction motors are used for driving air compressors, pumps, drills, hoists and grinding and concentrating mills.

The new United States battle ship "Connecticut" is to be lighted throughout by electricity. The electrical plant of the ship will consist of eight 100-kw. steam driven generating sets, all of 125 volts at the terminals, disposed in two separate and independent dynamo rooms. Six electrically driven generators will supply current to turret turning motors. There will be 1100 electric fixtures, complete, with necessary incandescent lamps and outlets; ten inclosed arc lamps located in engine and fire rooms; six 30-inch searchlights mounted on platforms on the bridges, with spare parts; two truck lights with controller and stand complete; electric night signaling sets, diving lamps, ventilating sets, desk and bracket fans, &c. The vessel will also have a wireless telegraph outfit.

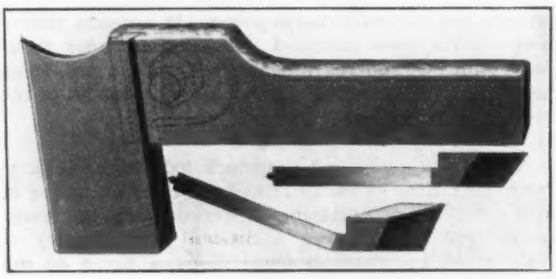
Vulcanite, or ebonite, which is largely used in electrical apparatus on account of its high insulating resistance, as well as for the fine finish which it will take, is met in the workshop mostly in the form of rods and sheets, and must be worked with the same tools which are used for working metals. Although easy to machine,

it is hard on tools; and in sawing, turning, planing or milling the best speed is that at which brass is machined, and milling should always be accompanied by a free use of soap and water. The best qualities of the substance show on fracture a luster something of the nature of jet, while the poorer qualities show a corresponding dullness.

The signal corps of the German army has had a large measure of success in recent experiments with acetylene for signaling purposes. Mixed with a certain percentage of oxygen, it can be plainly observed in daylight at a distance of 5 miles, which range is increased to 15 miles at night.

The O. K. Cutting Off Tool.

The main feature of the cutting off tool manufactured by the O. K. Tool Holder Company of Shelton, Conn., is that it will not dig into the work. If this tool starts to dig in, it slips down and back, instead of breaking the blade. Under these circumstances, all that is necessary is to draw back the carriage, loosen the blade, shove it up to the central position again and go ahead. As the blade is adjustable vertically, the holder can always remain level. By this means the cutting edge always maintains the same angle of clearance. At the center of the cutting edge is a slight projection, the object of which is to divide the chip. Since the



THE O. K. CUTTING OFF TOOL.

grinding is all done on the top, the cutting edges are always square with the sides. The clamping device is so arranged that nothing extends beyond the blade on one side, thus enabling the blade to go up close to the chuck. The holder is provided with both straight and offset blades.

Marietta Sheet & Tin Plate Company.

The Marietta Sheet & Tin Plate Company expect to have their plant at Marietta, Ohio, in operation early in January. The main building is 120 x 300 feet, being of steel construction and covered with corrugated iron. A 20-ton traveling crane was furnished by the Case Mfg. Company, Columbus, Ohio; the electric lighting plant and motors by the Northern Electric Company, Madison, Wis.; shears and others machinery by the Wheeling Mold & Foundry Company, Wheeling, W. Va.; the engine by the Newburg Foundry Company, Newburg, N. Y.; the furnaces by Edward E. Erikson, Pittsburgh, and the boilers by Erie Iron Works, Erie, Pa. The tin house and finishing department, 50 x 180 feet, is not yet under roof, but will probably be ready early in January. The officers of the company are: M. F. Straus, president; Lakin C. Taylor of Cambridge, Ohio, secretary; A. P. Bronson, formerly manager of Cambridge plant of the American Tin Plate Company, treasurer. David Llewellyn, formerly of the American Tin Plate Company, at Midletown, Ind., is superintendent. The plant will be thoroughly modern, and is located on the Pennsylvania Company's tracks.

A Customs Congress of the American Republics is to be held at New York on January 15, 1903.

Briquetting Iron Flue Dust.

BY R. M. HALE, SOUTH CHICAGO, ILL.

The process of briquetting flue dust has hardly arrived at that stage where it can be called an exact science. Nevertheless, considerable progress has been made toward this end, and the saving gained by using briquettes is believed to tend to the more successful and economical operation of the blast furnace.

The cardinal principles of successful briquetting are:

1. Thorough amalgamation of the binding materials with the flue dust.
2. Thorough pugging with pressure.
3. Additional pressure after the material has been forced into the molds.
4. Slow but thorough drying.

In pursuing this subject further it might be well simply to describe the methods employed in the manufacture of briquettes before discussing the salient points of certain methods or the conclusions deduced from the actual operation of the methods.

Delivering the Flue Dust.

Therefore, in the plant under consideration the dust is delivered in two ways. A part of the dust is delivered from the dust catchers into buggies and hauled to an incline cable road, conveniently located, thence up the incline, where it is delivered into a hopper and fed into hexagonal revolving screens and deposited in a larger hopper below. The dust so delivered is very hot. Some dust comes to the briquette plant in railway cars, being delivered directly from the dust catchers into cars. The dust so delivered is generally cold and wet, it not being found advisable to ship the dust hot in ordinary railway cars. The dust is unloaded from the cars and delivered to a large storage bin at the briquette plant. From this bin it is carried by an incline belt conveyor and delivered through suitable spouts to another hexagonal revolving screen, and the fine dust is deposited in the hopper below. These screens are of the usual revolving type, having an elliptical mesh ¾ x ⅜ inch. Anything fine enough to pass through this mesh is not large enough to do any harm to the machinery beyond. The coke obtained from screening the flue dust is put back into the furnace, thus effecting an important saving. The two screens are located over the same hopper, the hot dust being separated from the cold dust by a partition.

At the bottom of the hopper above mentioned are two automatic feeders, which feed the hot and cold dust into the conveyor mixer, where the hot dust absorbs all or a portion of the moisture from the cold dust. These feeders are adjustable, so that the feed can be changed readily, according to the heat and moisture in the dust, thus giving a resultant dust of a nearly uniform character.

The conveyor mixer consists of a long U-shaped trough of sheet steel, having a 4-inch square shaft running horizontally through it, upon which shaft are bolted blades spaced 3 inches apart and placed at an angle of 30 degrees to the shaft. As these blades revolve a thorough mixing of the dust is obtained and at the same time the dust is moved forward through the length of the conveyor mixer.

Adding the Bonding Agent.

From this conveyor mixer the dust is delivered onto an incline belt conveyor and carried up to a large storage hopper above. On the bottom of this hopper are two more automatic feeders, one for each press. Each of these feeders feeds into a conveyor mixer, into which mixer is also fed the bonding agent. It is here where the dust and the bond are first amalgamated. The bonding agent, which consists of lime, soda ash and salt, a patented bond, is dumped into a small skip hoist from the main floor of the plant and carried up to a tank on the upper floor. First, a certain amount of salt and soda ash, previously determined, is dumped into the tank on the top floor, which contains water; this mixture is then allowed to boil for about 20 minutes, after which operation lime is dumped into the boiling brine and allowed to slake. The tanks are 4 feet in diameter and

4 feet high, having a vertical shaft through the center carrying paddles. The shaft and paddles are given a rotary motion by means of suitable gearing, &c., thus obtaining constant agitation of the mixture in the tank and preventing any of the substances from settling to the bottom.

The lime, salt and soda ash are allowed to remain in the upper tank until the whole becomes of the same consistency, the thickness of which depends upon the amount of lime added. It is then lowered to a tank on the floor below and from there is allowed to run into the same conveyor mixer as the dust, through a 2½-inch brass gate valve. By means of this gate valve the amount of bond can be regulated at will according to the possible variation in the dust.

The Press.

From this mixer the dust and bond fall through a spout into the pan of the press, where it is pugged with pressure by alternately being rolled and plowed up and rolled and plowed again. The pan of the press is about 7 feet in diameter, through the center of which extends vertically a shaft carrying two large rollers, each weighing 6000 pounds, and a plow beam carrying four plows. By this means the more thorough amalgamation of the bonding material with the flue dust is accomplished. The plows being set at an angle with the plow beam throw the material directly in the path of the rollers, where it is rolled down under a pressure of 6000 pounds and immediately plowed up again by the plows following the rollers. The rotary motion of the rollers and plows gives to the material a creeping motion, so that it gradually travels along the circular path of the rollers to the point of exit from the pan.

Into a section of the press pan extends a portion of the circular mold disk. This disk is 5 feet in diameter by 2½ inches thick, its center being outside of the press pan. In this disk are 72 holes, in three rows of 24 each, these holes being 3 inches in diameter at the top and 3¼ inches at the bottom. As the holes pass around the press pan they are filled with flue dust under pressure of the rollers. They then pass out of the press pan and are brought under a set of repress plungers, where additional pressure is given to the briquettes.

Motion is imparted to the mold disk by a rather simple device. Resting upon the top of the disk in a radial line is a pawl arm, its center being the center of the disk. Fastened to the outer end of the pawl arm is a crank arm connecting with a crank pin on a gear. When the crank arm is on its forward center a pawl pin drops down and engages the disk in one of the mold holes, so that as the crank arm travels toward its back center the disk is moved around the required distance. The movement of the disk is accomplished at a time when the rollers are not on it, so that the energy required is that simply of rotating the disk and a small amount of flue dust. The repress plungers are operated by a toggle, so that they are capable of exerting a large amount of pressure on the surface of the briquettes. The pressure can be varied by inserting different length toggle blocks, thus increasing or diminishing the travel of the repress plungers downward as may be desired. The upward motion of the plungers is independent of the toggle motion and is accomplished by means of a hook engaging a block upon the main shaft, from which shaft the toggle also derives its motion. Thus the plungers are always brought to the same position on the up stroke. All this is accomplished while the crank arm is passing from its back to its forward center.

The Drying Operation.

From the repress the briquettes are passed around until they come under the ejector arm, where they are ejected and drop on a conveyor belt. This belt carries the briquettes some 12 feet from the press, where they are loaded into cars by boys. These cars move in a direction at right angles to the travel of the belt and after being loaded they pass onto a transfer car which transfers them to the drying ovens. The drying ovens are 200 feet long and are two in number, each oven having two tracks. Each track holds 27 cars and is always kept full so that as a car of green briquettes is pushed in at one end a car of dry briquettes comes out at the other end. These cars of dry briquettes are put on another transfer car and transferred to the unloading track, where they are unloaded, and then pass on up the same track to be loaded again with green briquettes. The dry briquettes are shoveled into buggies and put into the furnaces in the manner in common use at furnaces, either going up in a skip hoist, where the furnaces are so equipped, or in the old style elevator.

This in general is the method employed in briquetting. It looks very simple, but as a matter of fact it is not so. There are a great many points which will bear deep study and careful attention.

Fine dust is an especially hard material to work. It has no plasticity; its action on all working parts of machinery is like powdered emery; it grinds and cuts everything with which it comes in contact. The dry dust blows with the slightest gust of wind and is thus carried and lodged on all parts of the machinery. Eternal vigilance is certainly a prime requisite to keep such a plant in good running order.

Aside from the purely mechanical questions involved in designing and operating such a plant, the three most important points are:

1. The bonding agent.
2. The amount of pressure and the pugging which the green briquettes receive.
3. The drying ovens.

Unless these three questions are successfully solved the mechanical superiority of the plant will not enable successful briquettes to be made. On the other hand, with these three points successfully solved and the mechanical standard of the plant low, briquettes cannot be made economically.

The Bonding Agent.

Lime is the most natural bonding agent to which all blast furnace men first turn their attention. They want lime in the furnace, and if the percentage of briquettes in the burden is large enough the lime in them can be reckoned and a proportionate decrease in the amount of limestone used is thus obtained. But it is impossible to make a good hard briquette with lime alone as a binder. The function of lime in the briquette is threefold:

1. To give hardness to the briquettes.
2. To make the material more plastic, so that it can be worked to better advantage in the press.
3. To make the briquettes self fluxing.

As was stated before, it was found that lime, in itself, would not give sufficient hardness to the briquettes to enable them to withstand the severe handling to which of necessity they must be subjected. Therefore some other bonding agent was sought which would increase the hardness of the briquette and yet which would not have chemical properties objectionable in the furnace. The consideration of the cost of any additional bonding agent was one of considerable moment.

After some experimenting it was found that a good grade of commercial salt would increase the hardness of the briquettes. But with the added percentage of salt the cost was increased and therefore it was decided to sacrifice, to some extent, the second function of lime in order to maintain the total percentage of the bonding agent the same and thus keep the cost nearly constant, lime and salt being nearly the same price per ton. For instance, 6 per cent. of lime was first added and then 2 per cent. of salt. This made the cost too high, so the lime was cut down to 4 per cent. and the salt remained at 2 per cent. The sacrifice of the second function of the lime was made up in another way, which will be shown later.

The lime and salt briquettes, while they were quite hard at first, were found after a time to absorb moisture from the atmosphere, so that they crumbled to dust again, thus rendering the briquettes practically useless for commercial purposes, and it seemed as though the experiments had produced no good results. Commercial salt contains calcium chloride, and this calcium chloride is the moisture absorbing property of salt; therefore it must be got rid of. Sodium carbonate or commercial soda ash added to calcium chloride produced sodium chloride and calcium carbonate, the latter an insoluble

substance, the formula being: $CaCl_2 + Na_2Co_3 = 2\ NaCl + CaCo_3$.

Briquettes made of salt treated with soda ash were found to be of sufficient hardness and non-absorptive, so that they would stand both the handling and the weather, but the cost was high and the percentages were again changed, this time to 2½ per cent. lime and 2½ per cent. salt and soda ash, thereby maintaining about the same total cost.

Probably the best briquettes produced were made with from 5 to 10 per cent. of salt and soda ash, but this was accomplished by the total sacrifice of the second and third functions of lime and at an increase in the percentage of chlorine put into the furnace, which was not deemed a wise procedure. Salt has another function to perform, and that is in relation to the character of the break. Pure lime briquettes crumbled into dust when broken; with the addition of salt the briquettes have a clean break and produce very little dust.

A thin milk of lime gives no plasticity to the flue dust. The plasticity of the mixtures increases in proportion to the thickness of the solution of slaked lime. Lime slaked in the ordinary manner and allowed to settle in settling tanks or pans becomes thicker and thicker the longer it is allowed to remain at rest. After several days it becomes of the consistency of soft putty. Briquettes made of lime of such a consistency are very good when green, but it was found that the extra expense incidental in handling lime thus made and in providing storage for so large an amount of lime more than offset the advantage gained. Therefore, this method was abandoned and the lime used as it was slaked. A very good thick cream of lime, about the consistency of soft butter, could be obtained in the ordinary lime tanks, in the space of time allowed, and considering all questions involved, for all practical purposes this solution was found to be the most economical.

The Pressure and Pugging.

To compensate for the loss of the second function of lime—that is, plasticity—attention was diverted from the chemical to the mechanical side of the question, and this leads to the consideration of the second point made—the amount of pressure and pugging which the green briquettes receive.

Pressure alone on flue dust will not make a good briquette. It is essential that the material should be pugged thoroughly to get the binder worked in and incorporated with the flue dust. This pugging process increases the plasticity of the material. A thin solution can be incorporated with the dust more quickly than a thick putty solution. The time occupied by the dust in traveling through the mixer and press was so short that with a thick binder the solution was not properly amalgamated. Hence the return to the thinner solution.

The briquettes when made did not seem to be very compact. The amount of travel of the repress plungers was not sufficient to compress the material enough to eliminate the small air spaces between the small particles of dust; therefore the travel of the repress plungers was increased and at the same time the pressure on the briquettes was increased. Thus a briquette was obtained of sufficient hardness to compensate for the loss in plasticity.

The Drying Ovens.

The third point, the drying ovens, then received attention. As stated before, the best briquettes were made with 5 to 10 per cent. of salt, but these briquettes were air dried—that is, they were allowed to remain out in the sun during warm weather for three or four days. These briquettes were considered the standard of excellence as to hardness and were rated as 100 in that scale for the matter of comparison. They could be thrown with considerable force against a concrete wall and simply have their edges broken.

Of course in this climate it is obvious that air drying could not be depended upon. But the point to be made was to obtain a drying oven as nearly like good atmospheric conditions as possible. The temperature of the air was not high, but the amount of air was large. Hence a large volume of air at a moderate temperature was desired in the ovens. Briquettes submitted to a high temperature at the start have a hard shell formed on the outside, varying in thickness from ¼ to ½ inch, and this shell, while not strong enough to withstand the handling, was a great disadvantage, inasmuch as it prevented the interior of the briquettes from drying. The moisture was held in. This is a good principle in cooking, but does not work well in briquetting.

The green briquettes should be submitted to a low temperature at the start, and the heat should be gradually increased as they progress through the oven. In this way the moisture is drawn from the interior of the briquettes to the surface and is then absorbed by the large volume of air passing over them. Properly dried briquettes show no shell on the outside. They are of the same hardness all through. The oxygen of the air acts with the salt, producing an oxide of iron, and this rusts the particles of the briquette together. A good briquette shows little rust spots, inside and out, and has a brownish red appearance.

As a matter of economy waste gas from the furnace, after passing through the stoves, is used for drying. There is very little free oxygen in this gas; hence the gas was diluted by the admission of air.

By a long series of experiments a briquette of about the hardness of 85 in the scale was obtained, with a temperature of 125 degrees at the entrance of the oven and 200 degrees at the end, using as a binder 4 to 5 per cent. of lime and 1 to 2 per cent. of salt, corrected with soda ash. These briquettes would stand the handling nicely and from all points were considered a success.

The cost of briquetting varies with the mechanical standard of the plant and the amount of tonnage handled. It would be difficult to make any specific statement which would fairly represent the progress of briquetting in this respect, but it is safe to say that in a plant handling a large tonnage the cost can be reduced to a remarkably low figure; in fact, in such a plant it would be practical to transport the dust some distance from the furnaces to the briquette plant, thereby increasing the field of usefulness of such a plant.

The binder used at present is a large factor in the cost per ton, averaging as it does about one-third of the total, and any advantage which can be gained tending to reduce this item is a matter worthy of attention. A binder which would cost less than 5 cents per ton of briquettes and which would at the same time fulfill all of the other functions of a binder, would be an enormous factor toward determining the final success of the briquetting proposition.

The value of flue dust briquettes is reckoned principally from the amount of iron contained in them. Taking into consideration this point and the saving derived from the reduction of fine material in the furnace burden, it is safe to say that manufacturing flue dust briquettes as an economical factor in the operation of blast furnaces is a matter worth serious consideration.

The La Belle Iron Works.—On Tuesday, December 16, the stockholders of the La Belle Iron Works will meet at Steubenville, Ohio, for the purpose of voting for or against an increase in the capital stock of the concern from $5,000,000 to $7,500,000. It is almost certain that there will be an affirmative vote on the proposed increase in the capital stock, which has been made necessary by the very large additions to plant and new works that have been built and are now under way at Steubenville. The La Belle Iron Works recently purchased about 400 acres of coal lands in the Connellsville region at a cost of about $200,000. It is the intention to erect a sufficient number of coke ovens on this property to give them a supply of coke. La Belle blast furnace, which is being rebuilt, will be ready to blow in about February. The principal additions to equipment that have been made by the La Belle Iron Works are a new blast furnace, an open hearth steel plant, blooming mill and large plate mill. These additions have about been completed, with the exception of the blast furnace, which will be finished inside of 60 days.

The production of tin in the Federated Malay States was 46,960 gross tons in 1901, as compared with 42,440 tons in 1900.

The Engineers' Club of Philadelphia.

The Engineers' Club of Philadelphia celebrated its twenty-fifth anniversary on December 6 with an elaborate banquet in the historic hall of the Union League Club, upward of 250 members and guests being present. The club was the outgrowth of the joint enterprise of the American Society of Civil Engineers and of the American Institute of Mining Engineers in establishing headquarters for their members and for foreign engineers during the Centennial Exhibition. This, during the year following the Centennial, suggested a closer co-operation among the engineers of Philadelphia, which at first assumed a social character. The club was organized at a meeting held at the residence of Coleman Sellers, the gatherings for some time being at the homes of the members, who at first numbered about 20. Soon afterwards technical papers and discussions became a more prominent feature and headquarters were established. Finally a house was taken, which has now been occupied for many years, and the presentation of papers and their discussion became the principal work of the organization, which published them in well printed and well edited proceedings. During the past ten years particularly the club has led a vigorous life and has not alone contributed greatly toward a consolidation of the engineering profession in Philadelphia, but has also contributed valuable data to its literature.

The president of the club is Henry J. Hartley of the Cramp Shipyard, there being present a number of past presidents of the club, including James Christie, John Birkinbine, Wilfred Lewis, Henry G. Morris and John C. Trautwine, Jr. Occupying seats of honor were also three of the four honorary members of the club, John Fritz of Bethlehem, Admiral George W. Melville and Coleman Sellers of Philadelphia. The exercises were conducted by James Mapes Dodge as chairman, the recently elected president of the American Society of Metallurgical Engineers. The speeches were of a very high order, were closely listened to and vigorously applauded. L. Y. Schermerhorn welcomed the guests, while Oberlin Smith, president of the Ferracute Machine Company of Bridgeton, responded to the toast of "Our Army Engineers" in the place of Gen. William P. Craighill, past president of the American Society of Civil Engineers, who was prevented from attendance at the last moment. Admiral George W. Melville, who was very enthusiastically received, spoke for the Navy engineers, while James Christie, mechanical engineer of the American Bridge Company, after reading messages from leading engineers, who sent greetings, responded to the toast, "Our Honorary Members." This brought out a charming little speech from one of them, John Fritz, and interesting reminiscences from Coleman Sellers. An able and suggestive address was delivered by Charles F. Scott of Pittsburgh, who represented as president both the American Institute of Electrical Engineers and the Engineers' Society of Western Pennsylvania, his topic being "The Engineer of the Twentieth Century." Robert W. Lesley, in responding to the toast of "Commerce," brought out in a telling manner its dependence upon engineering. John Birkinbine, president of the Franklin Institute of Philadelphia, in closing a happy speech on "Engineering and Our Kindred Societies," alluded to the new honors of Mr. Dodge, the toastmaster. The rapid growth and the great enterprises of the University of Pennsylvania was the burden of the address of Prof. Arthur W. Goodspeed, whose subject was "Our University." Wilfred Lewis, one of the founders, spoke of the early history of the club, while John C. Trautwine, Jr., the editor of the transactions of the association of engineering societies, in responding to the toast, "Our Technical Press," dwelt upon the progress made by the engineering journals, but coupled with it the regret that the multiplicity of them represented much waste energy. The proceedings closed with a speech by Peter Boyd on "The Union League."

The attendance included representatives of nearly all the leading technical societies and of all the different branches of the profession. Among those present were: George V. Cresson, Thos. C. McBride, secretary, and George T. Gwilliam, treasurer of the club; Walter Clark, Washington Jones, Francis Schumann, A. Falkenau, D. J. Matlack, Paul L. Wolfel, A. Bonzano, Prof. Edgar Marburg, Tinius Olsen, P. G. Salom, A. C. Vauclain and Dr. H. M. Chance of Philadelphia, George Mesta of Pittsburgh and C. W. Baker and C. C. Schneider of New York.

The *menu* was notable for its characteristically engineering features, the cover being a blue print with a design embodying the emblems of every branch of the profession. The *menu* proper, the lists of toasts, of committees and of guests representing sister societies, were printed on tracing cloth. It was bound with a blue and yellow ribbon, the colors of Philadelphia.

The Proposed New York Barge Canal.

At a gathering and banquet of the Board of Trade of North Tonawanda, N. Y., Herbert P. Bissell of Buffalo spoke on the advantages of a 1000-ton barge canal, and in the course of his remarks he pointed out much that is of general interest to the iron and steel trade. He said in part:

We have been accustomed to regard the canal as mainly useful for the transportation of breadstuffs, coal and lumber. You are well aware of its usefulness and value in the transportation of lumber, and I will pass that by and present to you an attractive illustration of the benefits to be derived, both in the Tonawandas and Buffalo, from its improvement and the development of the iron and steel industry on the Niagara frontier. A few years ago William A. Rogers and his associates of Buffalo rebuilt the North Tonawanda blast furnaces, which had lain for many years in ruins. Other clear headed business men have recently turned their attention to the favorable location of the Niagara frontier for the iron and steel industry. The Lackawanna Steel Company, with a capital of $40,000,000, have removed their large plant from Scranton and are now completing one of the finest steel plants in the world at Stony Point. Mr. Rogers, associated with the Messrs. Goodyear, has arranged for the construction of extensive blast furnaces on Buffalo harbor, while the firm of Marcus A. Hanna & Co. of Cleveland are now operating three large blast furnaces on the Buffalo River. Now, why has the Niagara frontier been selected for this industry? It is due entirely to the magnetism of the cheap transportation facilities; it is because the raw material for the manufacture of iron can be assembled at Buffalo and Tonawanda at as cheap a rate as at any point in the United States, and our location for the cheap distribution of the manufactured product is more favorable than any other point in the United States. In centuries past nature deposited a great mass of thousands of millions of tons of iron ore in the regions of Lake Superior, and this ore can be brought to the foot of the Great Lakes by water transportation as cheaply as it can be brought to Cleveland, or to Conneaut, and from Conneaut it must bear freight charges to take it to Pittsburgh, which has heretofore been the most advantageous point for the manufacture of iron.

As showing the great scarcity of coke, we may state that one blast furnace in the Mahoning Valley is said to have received in October only 77 cars of coke, or about four days' run. This included some outside coke, for which premium prices were paid.

The fire loss of the United States and Canada for the month of November, 1902, amounted, according to the records of the New York *Journal of Commerce*, to $10,546,000, as against $9,593,800 in the preceding month and $13,478,000 in November, 1901. The total loss by fire in the 11 months ending with November is given at $134,644,350, or nearly $14,000,000 below the figures for the corresponding period of last year.

Blast Furnace Gas Engines and Their Work.*—II.

Let me begin a discussion of individual designs with the ordinary four-cycle engine. At the Düsseldorf Exhibition this system was represented by two firms, the Gasmotorenfabrik Deutz and Louis Soest & Co. The Deutz works thus far have made the cylinder with a maximum of 250 to 300 horse-power capacity the basis for their larger engines. In double and quadruple engines they therefore reach 1000 to 1200 horse-power. At the exhibition they had a 1000 to 1200 horse-power engine coupled direct to a Stumpf-Riedler blowing engine built by the Gutehoffnungs Huette. In a general way the engine possesses the advantages and disadvantages of the single-acting four-cycle motor. As compared with engines with a smaller number of cylinders, it has the advantage of greater regularity and of larger reserve in the case of the failure to work of one cylinder. Two cylinders each are placed on either side of the crank shaft. The most difficult detail, the cylinder head, has one admission and one exhaust valve, placed in special cages in such a manner that the admission valve is placed in the upper part and the exhaust valve in the lower part of the inner wall, and that a gas valve is placed in a casing screwed on. Since the engine does not have piston rods which pass through the cylinders, the exhaust valve, which is cooled by its hollow spindle, is accessible after removing the upper valve box. This is certainly an improvement in construction as compared with the former design with a large number of valves. The valves are operated by cams from the valve gear shaft. The latter and the driving gear are naturally, under normal conditions of working, put under a strain of 3 to 4 atmospheres when the exhaust valve is lifted.

Two Hartung governors whose rods are not coupled take care of the regulation. The well-known phenomena of irregular working of the cylinders will appear, a fact which will not disturb the driving of blowing engines. The admission of gas is so regulated that with a light load the gas is supplied later, while a larger amount of air is drawn into the cylinder. When running with a light load or with no load, therefore, work must be done with dilute mixtures and the attendant drawbacks in regard to ignition.

The Deutz Company, like other works, have recently changed the governing gear. Fig. 3 shows the latest Deutz cylinder head in section. It will be observed that the gas valve and the inlet valve are combined with a piston valve for the admission of air in the same casing and are mounted on the same spindle. When the valve spindle is pressed down by the gear mechanism the inlet is first opened, and the air valve and the gas valve follow a moment later, opening inward or downward. All the parts thus moved must therefore be closed upward by the pressure of a powerful spring.

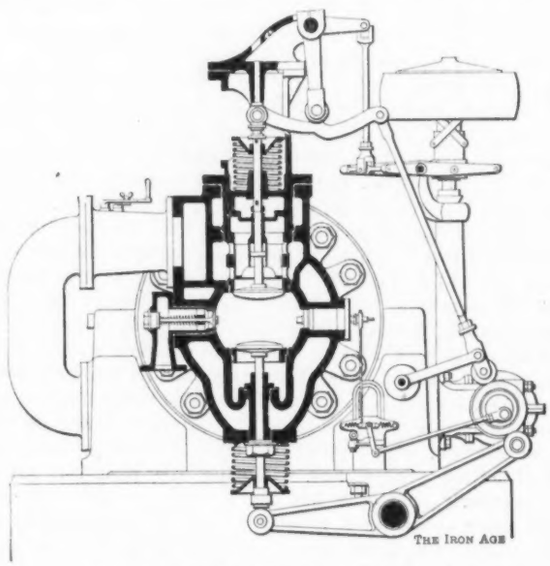


Fig. 3.—Section through Cylinder Head.

SINGLE ACTING DEUTZ FOUR-CYCLE ENGINE.

One end of the valve lever is attached to the valve spindle, the other end seizes a rod driven from the gear shaft. The support of the valve lever is a roller. When the driving rod is lifted the valve lever presses against the roller and the inlet valve is forced downward. When the driving rod descends the valve is gradually closed. The arrangement is so made that the valve opens with the beginning of the suction stroke and closes toward the end of that stroke. The roller is borne by a lever which oscillates on a shaft acted upon by the governor, and the valve lever is so shaped and so arranged that its upper surface, when the valve is closed, forms a circle tangential to the roller circumference, the center being the center of the shaft operated by the governor. When the governor by a turn of the shaft changes the position of the roller the valve is kept open for the same period of time as before, only it is opened more or less. The regulation, therefore, amounts to throttling of the supply of gas and air mixture in such a manner that by simultaneously changing the sections of the gas and air passages so that the mixture remains the same and only a larger or smaller

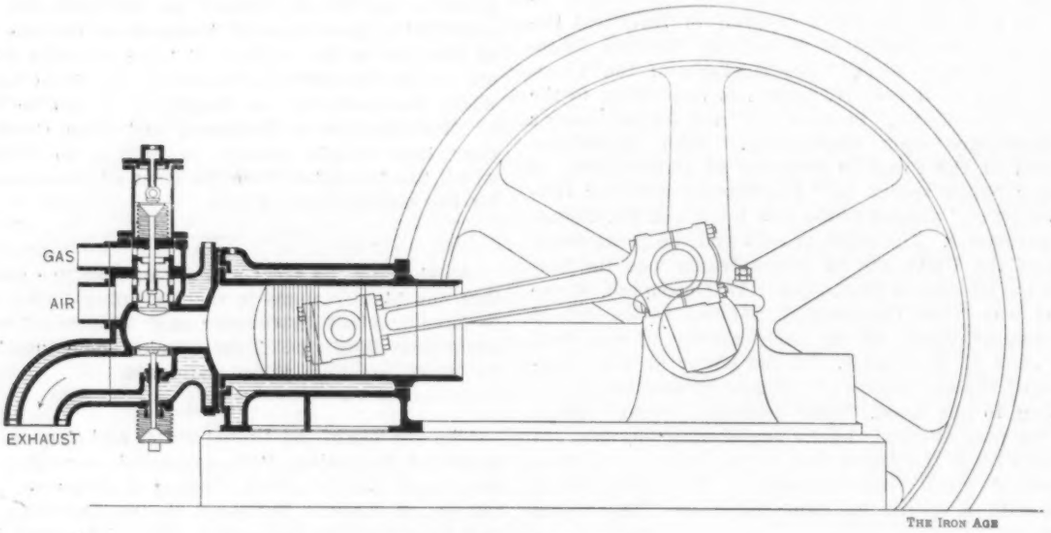


Fig. 4.—Longitudinal Section.

SINGLE ACTING DEUTZ FOUR-CYCLE ENGINE.

* Abstract of paper read before the Verein Deutscher Eisenhuettenleute by Direktor Reinhardt of Dortmund, Germany. Continued from *The Iron Age*, December 4, page 28.

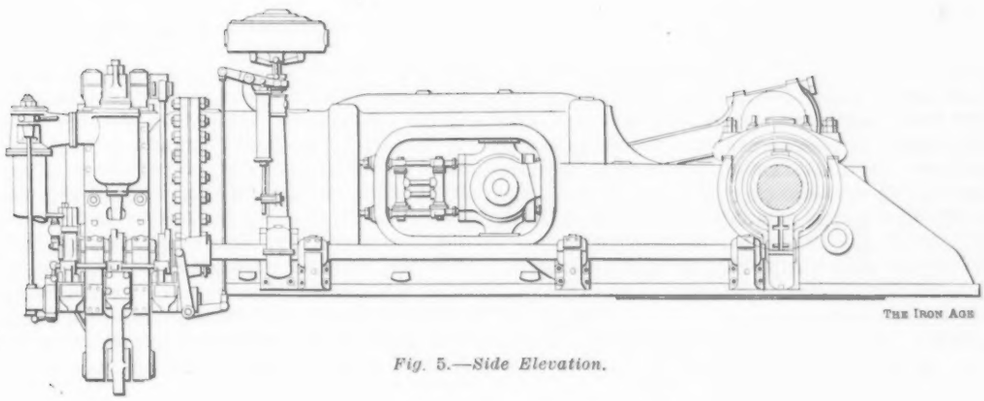


Fig. 5.—Side Elevation.

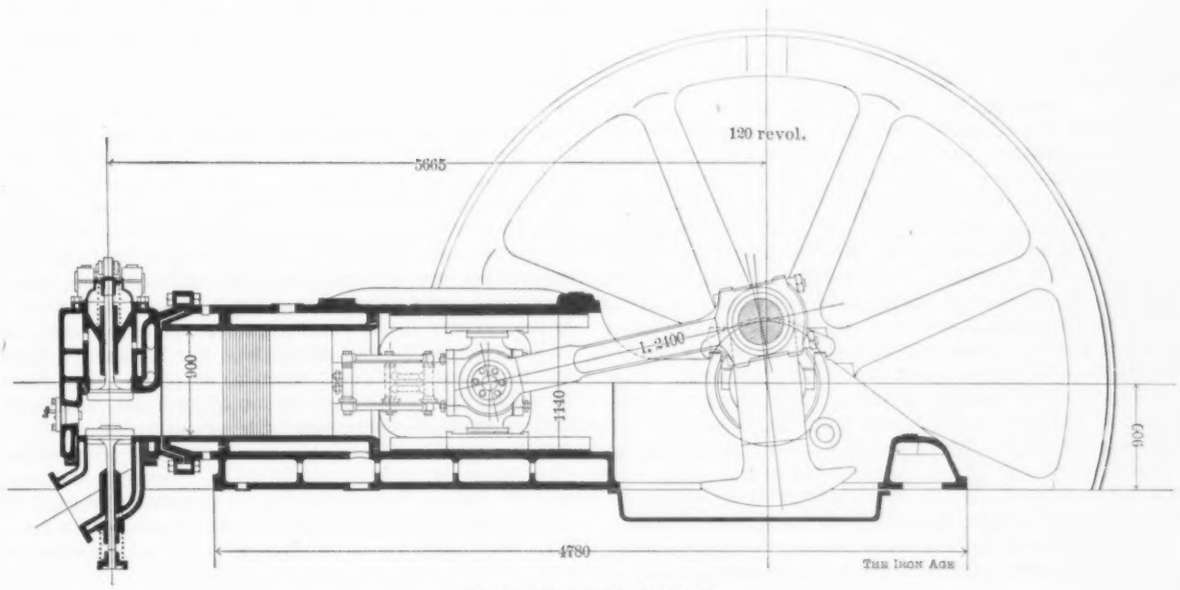


Fig. 6.—Longitudinal Section.

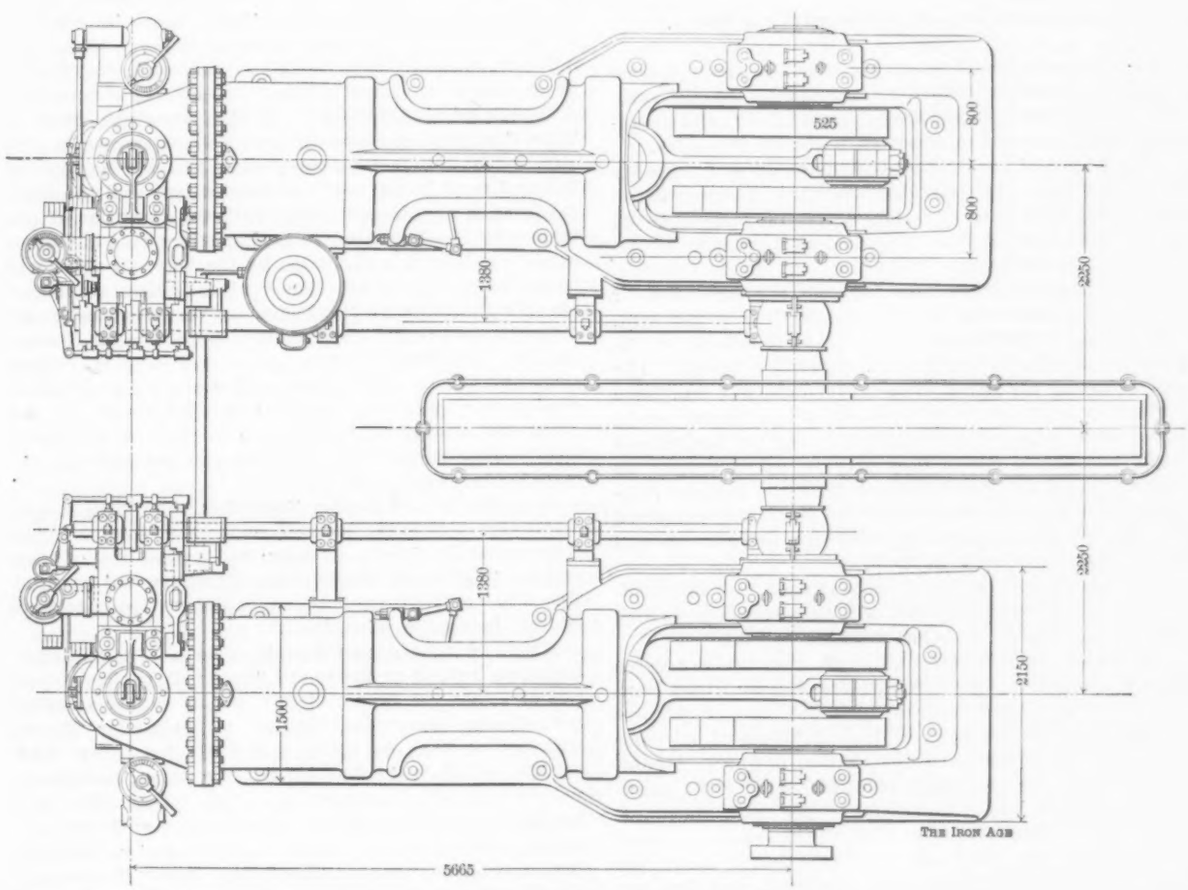


Fig. 7.—General Plan.

SOEST 600 HORSE-POWER BLAST FURNACE GAS ENGINE.

quantity enters the cylinder. By this regulation, therefore, the compression is also changed. In spite of this the combustion and consequently the regularity of running and the gas consumption under light loads are said to be better than when the work is done with an excess of air and unchanged compression. In principle this gear is the same as that employed earlier by Koerting and by the Nuernberg shop. A thorough cooling of the flanges is provided in the new design of cylinder used, as is shown in Fig. 4.

I have not yet seen any engine provided with this gear in operation. The Deutz Company, however, advise me that they have a small 35 horse-power motor of this type running, that the gear works very quietly and has only a slight back pressure.

Louis Soest & Co.

The firm of Louis Soest & Co. have exhibited a 300 horse-power engine, the design of which is similar to that of well-known engines. It is well worked out and makes a pleasing impression. The piston is water cooled and the cylinder head has a gas valve and an inlet and exhaust valve, placed one above the other. The exhaust valve is located so low that dirt and oil residues may be blown out. The valves are located far into the cylinder head, so that the inner wall is partly cooled from within and from without. The firm note as a novelty the following arrangement: With a single turn of the hand it is possible, in starting, the movement of the inlet valve may be cut off, the exhaust valve is made to operate and is changed, with a lessening of the compression, to a two-cycle movement. This arrangement is certainly practical. The first gas engine built by the firm is that shown at the Düsseldorf exhibition. Its work under normal condition cannot be judged because it was not doing work at the exposition. Soest & Co. have also shown drawings of an engine of 600 to 700 horse-power for which two orders are at hand. The engine has a cross head and is regulated by simultaneous changing of the gas and air mixture, Figs. 5, 6 and 7.

American Bicycle Company's Affairs.

Plans for the reorganization of the American Bicycle Company have been practically completed by the committee of bankers at work upon their affairs, and an official announcement is expected within a few days.

The terms of the proposed adjustment will probably be submitted to the stockholders at a meeting to be held next week, and as soon after its acceptance as practicable the court will be asked to discharge the receivers.

It is understood the plan includes the formation of a new company, who will exchange their 6 per cent. noncumulative preferred stock for the $9,500,000 of the present company's 5 per cent. debenture bonds. The new company are not to issue any bonds, but will issue $2,500,000 of 6 per cent. cumulative preferred stock, which will be issued to stockholders for the assessment of $9 per share, which they will be asked to pay on both common and preferred stock of the present company. Of the old stock there is $9,294,900 preferred and $17,701,700 common, so that the assessment will raise about $2,500,000 in cash.

The assessment will not only pay off the indebtedness of the old company, but will furnish the new with what is considered sufficient working capital.

In addition to the preferred stock they are to receive on the assessment, the stockholders will be given common stock to 50 per cent. of their holdings of old preferred and to 25 per cent. of their holdings of old common. On this basis the capitalization of the new company will be approximately $2,500,000 6 per cent. cumulative preferred stock, $10,000,000 6 per cent. noncumulative preferred stock, and $10,000,000 common stock.

It is said the receivers have practically completed the work for which they were appointed, and that the consolidation of the company's plants, the reduction of expenses and the liquidation of their indebtedness have been carried as far as it is possible to do so.

Pacific Coast News.

SAN FRANCISCO, CAL., November 29, 1902.—The near approach of the close of the year does not seem to have much influence in diminishing the volume of business in this city for, notwithstanding this, the amount of sales in merchandise generally seems larger than ever if we are to accept the figures of the Clearing House as an indication of what they really are. The fact is that the Clearing House figures continue to grow in magnitude as the year passes away. For the week ending with last Saturday they were $32,723,287.85, about 26 per cent. larger than the corresponding week last year, and much larger than any other week in the history of the Clearing House, save alone one collection week. Now, though a great deal of this is to be referred to financial operations, which are of greater magnitude than ever before in this city, the steadily swelling stream of clearances cannot all be explained in that way.

There is a much greater volume of sales than ever before, and this refers more perhaps to the hardware and metal business than any other. Certainly the clerical force and the salesmen in every house are as busy as they can be these late autumn days, from morning to night and even on this, the eve of Thanksgiving. Of course this applies especially to builders' hardware, on account of the great number of buildings now being erected in town and country, but it is true to a greater or less extent of all. But prices in some lines are not as satisfactory as they might be. For instance, a leading merchant in stoves, mantels, &c., told your correspondent that while the volume of business was satisfactory enough, there was little or no profit, as there was too much competition. And happening to revert to the matter of trade combination in answer to a query as to whether a combination of houses in regard to prices might not be a good thing, answered, "Yes." This, of course, could not be construed into favoring a hardware combination to cover the United States. I think, though, that a combination just covering the matter of prices, if it could be arranged some way, would find general acceptance, but then it must be confined to the Pacific Coast where, in many respects, things are different to what they are in the East or in the Middle West, and where trade interests are not the same at all.

The vast establishment of the American Steel & Wire Company on Sixteenth and Folsom streets, in this city, is fast approaching completion, and will be finished before I send in my next communication. All the clerical force is now housed there, with the exception of one man, who is left at the old headquarters on Pine street to take in orders, and where, by the way, an office will be maintained for good. The business offices are incomparably the finest on the Coast. A very pleasant event took place when the clerical force moved in on November 15. The business force presented Geo. H. Ismon, the Pacific Coast sales agent, with a superb set of plate, consisting of 95 pieces wrought in solid silver. It was altogether unexpected, and was a forcible expression of their appreciation of his business abilities and his uniform kindness and courtesy.

Imports by rail during November have been heavy. Those by sea have been of moderate volume. The "Invernesshire" from Antwerp had a good deal of steel, and the "Crown of India" from Hamburg had bar iron. The "Newport" from Panama had about 7000 packages of iron, hardware, wire, &c.

There have been considerable exports. The "Gaelic" had type valued at $2666 for Japan; 81 packages, valued at $2369, for Japan; electric goods, valued at $6500, for Manila; hardware, valued at $148, for Korea; watches, at $830, for China and $9911 for Japan; lead, 449,330 pounds, valued at $13,480, for China; machinery, valued at $1950, for Japan, &c. The "Zealandia" had hardware, valued at $4610; pipe, valued at $1729; machinery, valued at $10,315; pipe, at $77, and agricultural implements, at $28, for Honolulu. The "Rosamond" for Honolulu had machinery valued at $670 and sewing machines at $805. The "San Jose" had machinery valued at $260 for Panama, $345 for Mexico and $2915 for Mollendo. The "Karnak" had machinery valued at

$1382 for Mexico. The "Newport" had machinery valued at $137 for Mexico and $158 for Panama, and hardware valued at $756 for Mexico. The "Hong Kong Maru" had machinery valued at $1150 for Japan and $936 for Manila, and agricultural implements valued at $1500 for Manila. J. O. L.

Mexican Import Duties.

DURANGO, December 1, 1902.—As a direct result of the extreme fluctuations in the value of silver the president of the republic of Mexico has issued a decree for the purpose of "providing a basis for the liquidation and payment of duties in connection with the importation of foreign merchandise," from which the following is taken:

Article 1. On and after the first day of January, 1903, the laws of November 30, 1888, and May 12, 1896, creating respectively the 2 per cent. port works tax and the 7 per cent. stamp tax on import duties, will be abolished.

Art. 2. On and after the same date of January 1, 1903, the import duties on foreign merchandise brought into the republic will continue to be adjusted in accordance with the rates set forth in the import schedule, but the sum that would be payable according to that adjustment will be reduced by 50 per cent. and the amount thus found will be multiplied by the sum fixed by the Department of Finance for the settlement of duties during the month in question and which in no case will be less than 220 per cent. The product will represent the amount of import duties to be paid by the importer.

Art. 3. In order to determine every month the rate of settlement referred to in the foregoing article, the Department of Finance will take the average of the rates at which the banks of the capital have sold sight drafts on New York on each of the days comprised between the first and twenty-fifth of the month in which the announcement of the rate had to be made, making a reduction of 30 per cent. (or less if the liabilities of the nation payable in foreign coin increase in future) on the points of difference between the fixed exchange rate of 220 per cent. and the average in question. The said department, any day between the 25th and 28th of the month in question, will apprise the custom houses, through the general custom house bureau, of the rate adopted and at which duties are to be settled during the following month, said rate being published in the Diario Official.

Art. 4. The rate of settlement for import duties adopted for each month will be applied to merchandise carried in ships anchoring in the port of their destination, or brought in over our frontiers after 12 o'clock on the night of the last day of the previous month and before the same hour of the last day of the current month, even though in either case the adjustment of clearance formalities be effected at a date subsequent to the last day of the month during which the rate of settlement was in force. Goods imported through the mails will be subject to the rate for the settlement of duties in force on the day of their arrival in the country.

Art. 5. The stamp tax payable at the time of their importation by alcoholic beverages and foreign cards, as well as the additional duty for the benefit of the municipalities of the towns where the custom houses are situated, will be estimated on the basis of the import duties calculated according to the foregoing articles. The pecuniary penalties provided by the general custom house ordinances to correct infringements on those ordinances, will be computed in the same manner when those penalties are based on a percentage of the import duties.

Art. 6. Merchandise imported for consumption in the free zone, with the exception provided by Art. 676 of the general custom house ordinances, will pay only 10 per cent. of the duties calculated according to the terms of Art. 2 of this decree; but the tax for the benefit of the municipalities as well as the stamp tax payable with respect to alcoholic beverages and foreign cards, imported for use in said zone, will be estimated and paid on the basis of the full duties in question.

Art. 7. Merchandise imported for the free zone and similar merchandise produced in that region, and which is forwarded further inland according to the provisions of section IV, chapter XXII, of the general custom house ordinances, will pay duties at the rate of liquidation in force at the date when permission for forwarding the goods inland is solicited, and from the total of said duties the 10 per cent. spoken of in the foregoing article will be deducted, even though the merchandise may have been imported at any prior date. The duties on foreign goods moved from point to point of said zone will be estimated in the same manner, either with a view to collecting them when there is room for so doing, according to law, or with a view to the imposition of penalties provided for infringements of the same law.

J. J. D.

Chicago Building Record.

Substantial evidence of prosperity in Chicago is afforded by the November real estate record just issued, the transfers showing not only a large increase in value over the sales during the corresponding months for many years, but placing November among the foremost months of the current year of increased activity. And the same is true of actual building operations even to a much greater degree. But not only in the consummation of important deals has November been prominent; it has been rather more conspicuous as the birth month of other and greater real estate projects which the future will develop. With the information now at hand there is reason to believe that the year 1902 will break the record of the last decade in the value of real estate transferred. For the past 11 months, indeed, the property which has changed hands is exceeded in amount only by the sales made during the corresponding months in 1895 since 1892. The record for the entire year of 1902 bids fair to reach upward of $125,000,000. During the year 1895 the reorganization of two railroads—the Santa Fé and the Baltimore & Ohio—was largely responsible for the high record. But even so, the year 1902 makes a most favorable comparison, emphasizing the more the general activity and prosperity.

During the 11 months of the calendar year the real estate transfers aggregate 2405, exceeding by upward of $17,000,000 the value of the transfers made during the corresponding months of 1901. It is important, too, to note that judicial sales amounted to only $6,154,561, of which $4,500,000 were foreclosures, indicating that the forced liquidation incidental to the 1893 panic is practically over and reflecting a more healthful movement than has been seen in many years. That this opinion is shared by non-residents is the natural conclusion measured by the increased interest shown by outside investors, notably New York capitalists, who have been prominent in some recent real estate enterprises.

In some respects really more interest is aroused by the record of the actual building operations of the year than by the mere transfer of property. Already during the 11 months just closed the value of the new structures is over $45,000,000, and by the close of the year fully $50,000,000 will have been involved, the greater portion of which already has been distributed. Thus the building record of 1902 is without precedent, the value of the structures completed and under way during the past 11 months exceeding by from $10,000,000 to $13,000,000 the value of the buildings erected during any previous corresponding periods. The number of individual contracts in 1902, however, was exceeded during the years from 1893 to 1896, inclusive, many permits having been issued for cottages during those years. It is worthy of note that apartment houses are increasing in favor, predictions to the contrary notwithstanding, and even more significant is the number of permits issued for factories and warehouses recently, the former largely predominating. Much activity is being displayed in the machinery district of Chicago, in the neighborhood of Canal street, more especially in the demand for warehouse facilities resulting from the rapid growth of Chicago as a center of the distribution of machine tools and special machinery.

High Pressure Steam Piping.*

BY WILLIAM ANDREWS, NEW YORK.

The art of piping for high pressure steam is of legal age. Twenty-one years ago, when Edison, at Menlo Park, brought out his electric lamp and called upon the engine builders, boiler makers and steam fitters to assist him with better apparatus, 80 pounds steam pressure per square inch on the boiler was considered good practice. It is true that higher pressures had been used on steamboats and locomotives, but the majority of stationary engines used in factories and mills were slow speed engines, piped with ordinary merchant pipe and screwed fittings, put up by any one who could use pipe tools. Soon all this was changed for the better, high speed engines were introduced, pressures were raised, fittings and valves were made much heavier and put up with some regard to expansion and contraction.

When Edison decided to send an exhibit to the first Paris Exposition he connected a 125 horse-power high speed engine directly to a generator called "Jumbo," as it was the largest of its kind at that time. Steam at 120 pounds pressure was supplied to this engine, and when the trial test was pronounced successful all parties interested, bankers, engine builders, electricians, boiler makers and last, but not least, the pipe fitters, patted themselves on the back and, pointing with pride to their work, said, "Match it if you can."

Up to this time few, if any, flanged fittings had been used on live steam work; screwed fittings, however, had been improved very much, as to quality and quantity of material, and extra heavy pipe was being called for and supplied. The standard working pressure was 125 pounds.

About the year 1890 high speed, compound, noncondensing engines were installed in the central station of the Edison Electrical Illuminating Company of Brooklyn. This was the first prominent installation of engines of this type, and the specifications called for a steam pressure of 150 pounds. The pipe specification called for flanged fittings and full weight special pipe, all to stand a working pressure of 150 pounds. There were no patterns for such fittings among the Eastern manufacturers, and, presumably, none among the Western foundries. At any rate the fittings were made to order from special patterns and they are carrying steam to-day at full pressure. In this station was introduced the "double system" of piping, which became a fad for a few years, but, like the American buffalo, has almost become extinct.

About this time copper pipe became popular for high pressure work, probably on account of the ease with which it could be bent and formed into curves, which were just coming into fashion, but after a few years of use, having proved itself a very treacherous metal, it was discarded and now is very seldom used, except for expansion bends in exhaust pipes.

About 1892 wrought steel piping made in the regular way became so reliable that it was used in making bends and steam mains, and at the present time it is so generally used that if an engineer wishes wrought iron pipe, especially in the larger sizes, he has to call for it in his specifications and then wait for it to be made. Pipes, fittings, valves, pumps, engines and all material used in a modern first-class job are now required to stand a working pressure of 200 pounds per square inch.

Strange to say that during the development of the electric light and railroad interest almost the entire efforts of the engineers and owners were given to improving the engine, boilers, generators, heaters and pumps, to the exclusion of the piping. So far was this carried that it was no uncommon thing for the owner, after the above mentioned articles were bought and his attention was called to the piping, to say, "Piping, oh, don't worry about that, I will let my plumber put that up."

It may be but of place here to name the engineers who, during the dark days of high pressure piping, always called for and insisted on the best. They were William Lee Church, Frederick Sargeant, Charles E. Emery, J. H. Vail, E. J. Cooke, J. Van Vleck.

A modern high pressure steam job requires:

1. A good design.
2. Good material.
3. Skillful steam fitters.

The first requirement can be altered to suit the conditions, but the other two, never.

The Design.

Up to the year 1900 the almost universal design for a piping system for power plants was to carry a pipe for each boiler into a large steam header, whose cross section was equal to the sum of all the areas of the feeding pipes. If the designing engineer wanted to be very grand he made it larger without knowing just why. From this header pipes were carried to the various engines, of sizes called for by the engine builder. It was quite common to place steam separators in each line leading to an engine, but fashions changed in steam piping, as well as in clothes, and with the advent of high pressure and superheated steam sizes of pipes have been very much reduced. In the four large power houses now built in New York City, with an ultimate capacity of from 60,000 to 100.000 horse-power each, the largest steam mains are not over 20 inches in diameter, and these are used more as equalizing pipes than storage reservoirs. Some of our best plants have pipes which run from the header to the engine two sizes smaller than that called for by the engine builders. These pipes, before reaching the engine, are carried into a wrought iron or steel receiver, which acts also as a separator. This receiver has a cubical capacity three times that of the high pressure cylinder, and is placed as near as possible to the cylinder. The pipe from the receiver to the cylinder is of the full size called for by the engine builder. The object of this arrangement is, first, to have a full supply of steam close to the throttle; second, to provide a cushion near the engine on which the blow caused by the cut off in the steam chest may be spent, thereby preventing vibrations from being transmitted through the piping system, and, third, to produce a steady and rapid flow of steam in one direction only, by having a small pipe leading into the receiver. This steam flows rapidly enough to make good the loss caused during the first quarter of the stroke. Plants fitted up in this way are successfully running where the drop in steam pressure is not greater than 4 pounds, although the engines are 500 feet away from the boilers. This is probably the most radical departure in high pressure work up to the present time. Allowance for contraction and expansion is provided for by long bends, by using a double swing (like a gas bracket), on which the fittings turn on the threads of the nipple, and by producing what may be called initial tension. This can hardly be described in words, but is a rule of thumb method by which the skilled steam fitter puts a strain on the pipes when cold, so that when the pressure is put on the expansion removes this tension and there remains no strain on the pipe, other than that due to internal pressure.

Expansion joints of the old slip style, or those made of corrugated copper, have entirely disappeared from the modern first-class job.

Quality of Material.

As to quality of material, in the earlier days of electric light and railroad plants, owing to the difficulty of keeping the screwed joints tight, some engineers tried flanged cast iron pipe for steam mains, but it was heavy and clumsy and sometimes cracked on account of the unequal expansion. Then came copper, and this pipe, even when reinforced with steel wire wound around it, was found to be a treacherous metal. Flanged cast steel pipe was tried, but the difficulty of obtaining this free from blow holes barred it out. At present the material used is either wrought steel or wrought iron pipe, on which the flanges are either riveted, screwed or welded. In England and on the Continent they weld a light flange to the end of the pipe and face it; it is pulled together when in use by a heavy steel or cast iron flange,

* A paper read before the Engine Builders' Association of the United States.

which had previously been slipped over the pipe, very much as copper joints are made in marine piping.

In 1880 the New York Steam Company installed about 6 miles of steam mains under the streets of the city of New York for power and heating purposes. All the joints in this pipe above 8 inches in diameter were made by expanding the pipe into recesses in the flanges, and then beading the ends of the pipe over the edges of the flanges. This was done by machinery, and was well done, and at the time was considered a great improvement over threading or riveting, but in five years every joint had to be taken out on account of leaks and threaded joints were substituted. These threaded joints lasted until 1895, when all the pipes were renewed with new mains having heavy wrought steel flanges welded on the pipe. These welded flanges when turned true in the lathe make the most workmanlike and perfect steam joints in use at the present time, and their cost alone prevents their general use.

For a number of years the makers of flanged fittings and valves had their own standards of diameters of flanges, bolt circles and number and size of bolts. In 1894 they mutually agreed that all flanged fittings used for pressures up to 125 pounds should be called "Standard," and should be uniform as to diameters and thickness of flanges, diameter of bolt circle and number and size of bolts. On June 28, 1901, they further agreed that all extra heavy flanged fittings should be uniform on the above named points, and to-day, from Maine to California, the bolts, circles and size and number of bolts are uniform, unless ordered otherwise.

Valves have been improved very much during the last few years, and perhaps their present status is akin to that of whisky, "all of which is good, but some is better than others."

Gate valves are almost exclusively used in high pressure work, as globe valves, especially in the larger sizes, would be very clumsy, and they would also make a pocket in the pipe. If gate valves are used often enough to keep them in good order they will remain tight many years.

Corrugated copper gaskets placed inside the bolts and well pulled up will make a joint which will last as long as the fittings. The softer gaskets containing rubber, asbestos or lead alloys need constant attention, and when superheat is used they are rapidly destroyed. When the owner's bank account is strong enough ground joints without any gaskets are used. This makes a first-class job, but the price is all but prohibitive.

One of the very necessary points of a first-class piping job, and one which is very often overlooked, is to have extra heavy fittings on the gauge, lubricator and high pressure drip connections. A break in one of these pipes, while it may not shut the station down, would cause great inconvenience and would be a nuisance until it was fixed.

Disposing of Water.

The method of handling and disposing of the water of condensation has always been an open question. Some engineers think that the cheapest way is to draw it off through traps and discharge it into a hot well, and from there pump it to the boilers with other feed water. Others think that they can run the drips into the receiver of a pump and force it back while very hot --pump makers favor this method. Gravity return traps of the Albany, Pratt, Kelley and Bundy type have been used occasionally, and when well put up and taken care of they work well. The Holly gravity return system is the latest, most scientific and best method of disposing of high pressure drips. Its first cost sometimes deters an engineer from installing it, but when he finds that he can charge off the cost as an insurance policy on the life of the engine, on account of freedom from water in the cylinder, a beatific smile illumines his countenance and he orders it at once.

Vibrations which often accompany the installation of high speed engines in our modern buildings are many times laid to the bad foundations or the unbalanced condition of the engine. In almost all cases it is not true; the vibrations come from the bad piping and can be, and in many cases have been, removed without touching the engine or foundations.

There is no excuse at the present time for having a bad piping job, and yet there is a great deal of bad piping done. Should the underlying principles of good piping—namely, good design, material and workmanship—be more strictly adhered to, much less of the present piping would have to be done over a second time.

The present almost universal practice of asking for competitive bids and giving the work to the lowest bidder is responsible for this state of affairs.

Now, after we have brought our engines, boilers, valves and piping up to a high standard, along comes our friend Foster and, with his superheated steam, distorts and burns the valves, gaskets and other delicate parts and we will probably have to start all over again.

Shipments of Lake Ore in 1902.

The Lake Superior ore shipping season has closed, the final loaded ships having left the head of the lakes early this second week of December. It has been the most phenomenal year on record, chiefly on account of the great shipments, but in part on account of the smoothness with which every link in the vast chain that connects the mines, the transportation interests, the docks and the railroads, has borne the strain put upon it. It has been a season nearly a month longer than usual, on account of the early opening of navigation, which assisted not a little in the remarkable movement of freight.

With a few scattering cargoes to be estimated the totals of the year, compared with three preceding seasons, have been as follows:

Range	1899. Tons.	1900. Tons.	1901. Tons.	1902. Tons.
Mesaba	6,626,384	7,809,535	9,004,890	13,293,000
Menominee	3,301,052	3,261,221	3,605,449	4,270,000
Gogebic	2,795,856	2,875,295	2,938,155	3,600,000
Marquette	3,757,010	3,457,522	3,254,680	3,850,000
Vermillion	1,771,502	1,655,820	1,786,063	2,087,000
Michipicoten....	.....	62,000	300,000	350,000
Totals.....	18,251,804	19,121,393	20,889,237	27,450,000

For the past 30 years, up to 1900, the growth of the Lake Superior iron mining industry has been at the rate of about 17 per cent. annually. For 1900 the shipments from the five United States ranges were 19,059,393 gross tons. At an annual increase of 10 per cent from that time to 1910 there would then be shipments of 49,423,789 tons, and for the ten years a total of 334,089,402 tons. Should the same ratio of growth continue another decade the year 1920 would see shipments amounting to 128,192,572 tons, and for the 20-year period, from 1900, the total would be the stupendous figure of 1,200,555,063 tons. Of course such speculations are interesting merely as showing the possibilities of the future should such a growth be maintained—which of course cannot be expected. If for the decade from 1910 to 1920 the rate of increase should be reduced to 5 per cent., there would be a shipment in the latter named year of 80,506,908 tons, and for the 20 years of 956,826,099 tons. For the sake of the argument, it should be remembered that the increase to 1900 was nearly double 10 per cent., and that for the first two years of the decade it has been almost exactly 22 per cent. a year.

In recent writings by members of the United States Geological Survey on the subject of Lake Superior ores the amount of reasonably good grade ores in sight in the region is given at considerably less than the figure of shipments on a basis of 10 per cent. increase for ten years and 5 per cent. for another ten. It should however be borne in mind that on the old ranges discoveries of fresh bodies of ore have been made in recent years which have added greatly to the extent of the workable deposits. Mines which were supposed to have been exhausted have again become producers after more thorough explorations.

The total dividends of the lake copper mines in 1902 were $3,440,000, as compared with $8,360,000 in 1901.

Manufacture of Steel by the Electric Furnace.*

One of the striking features of the French people is that imaginative quality which finds expression in the creation of things fanciful. To-day the world of fashion pays tribute to its genius. Even in the world of commerce this quality voices itself, but in no case more poetically than when it calls the tumbling torrents of the Alps, utilized for the generation of electric power, *La Houille Blanche*, or literally "the white coal." The comparison with *La Houille Noire* is evident.

The writer was privileged to attend during September *le Congrès de la Houille Blanche*, held at Grenoble, when between 500 and 600 members made a tour embracing the Departments of Savoy, Upper Savoy, and Isère—a region abounding in water powers, developed and undeveloped. It is in this Alpine region, most liberally endowed by nature, that the electro-chemical and electro-metallurgical industries have made greatest progress. The established industries, while comparatively young, are well known, but special interest attaches to one of the newer branches of electro-metallurgy, the manufacture of steels by means of the electric furnace.

The remarkable development of steel manufacture in the United States within recent years lends a special interest to the electric furnace phase of the question, and one naturally stops to think what changes may be induced by the introduction of this new factor. That it is a factor no one conversant with what has been done will challenge. In France many capable metallurgists are at work developing electro steel making, such, for instance, as M. Harmet, at St. Etienne; M. Chavarria-Contardo, at Paris; M. Heroult, at La Praz; Keller, Leleux & Co., at Morbihan, and others. Steel of excellent quality is already being produced, and it will surely not be long before the electric furnace assumes a strong position as a fixed factor in steel making.

In the United States the proximity of extensive water power developments to the Lake Superior ore deposits and similar installations close to the titaniferous iron ores in New York State and Canada must awaken the interest of our metallurgists to the growing possibilities of the electric furnace.

It would be well nigh impossible in a single article to detail all that has been accomplished in France, but by following one certain process we may perhaps gain a fair idea of the general progress. The Cie. Electro-Thermique Keller, Leleux & Cie. erected a factory at Kerrousse, near Hennebont, in the Department of Morbihan, principally intended for the manufacture of carbide of calcium. The decision of the French courts awarding to M. Bullier all rights to make carbide of calcium in France prevented the operation of the works for that purpose and necessitated the substitution of another product. The apparatus for electro-metallurgical operations being available, the firm took up the manufacture of various ferro alloys and the treatment of iron ores upon a large scale. However, the manufacture of ferro alloys by electric furnace means is fairly well understood, and this article deals more particularly with the younger branch, which appears to be "the order of the day" with metallurgists, "The Electrical Manufacture of Steels." The use of the plural should be noted, for by the electric furnace it has been shown that all grades, from open hearth to the finest tool steels, can be produced. The writer has seen in the office of Keller, Leleux & Co., in the Rue Vignon, Paris, specimens of steel of various grades which compare very favorably with similar grades made by older methods.

Description of the Works.

The Kerrousse factory utilizes the waterfall of Blavet, by means of which about 550 horse-power is developed. The motive power consists of four vertical turbines of 135 horse-power each, which by means of suitable clutches can be coupled at will to a single horizontal shaft operating two alternating current generators of 200 kw. each, with two exciters, one of which is held in reserve. These alternators are so constructed as to give current at three different voltages, by changes in the outer coils. This plan is of great assistance where it is desired to operate various types of furnaces, or manufacture products requiring variations in voltage at different stages of the process.

The furnace room contains a battery of various types of electric furnaces for the manufacture of alloys, which occupy about one-half of the floor space; the other half being reserved for special furnaces for the treatment of iron ores and the manufacture of steels.

There is also a large electrical and chemical laboratory attached to the works, a grinding room and equipment for the manufacture of electrodes.

Before proceeding to a more detailed description of the process it might not be out of place to say a word about its origin and development. From information which has been gathered it appears that M. Keller obtained his first satisfactory results in the treatment of iron ores with the type of electric furnace which he styles the "two-electrode furnace" (*four à deux électrodes*), designed in 1889, and which he exhibited for the manufacture of calcium carbide at the Third Acetylene Congress, in September, 1900.

Two-Electrode Furnace.

This type of furnace employs two electrodes placed vertically side by side, each connected to the terminals of the dynamo. The walls of the furnace are of masonry and there is a refractory hearth, as in the ordinary types.

The operation and regulation of this furnace are such as to produce in the neighborhood of each electrode a sort of thermal focus, or distinct zone of reaction and high temperature, these two high temperature areas being put in series by the fused and partially fused materials under treatment. In this manner each zone is capable of being separately regulated and the sphere of greatest activity increased or diminished as may be desired.

The electric current enters by one electrode, traverses the fused or partially fused materials, by means of which the temperature of the mass is maintained or raised as may be desired, and then passes out by the other electrode. The arrangement of the furnace thus permits of changes in the zone of caloric action at either electrode by simply changing the position of the electrodes.

The employment of two thermal foci within the same furnace body permits of the use of larger and more powerful apparatus than would otherwise be feasible. However, the two-electrode type does not fully meet the desiderata of modern metallurgical operations:

1. Continuity of operation within the same apparatus.
2. The employment of apparatus of large capacity.

The electrodes are, of course, gradually consumed. In the two-electrode furnace the renewal of one or the other of these electrodes involves the shutting down of the furnace. On the other hand, the power of the furnace is also limited by the necessity of restricting the dimensions of the electrodes within limits possible of manufacture. However, by the use of several electrodes in parallel, upon the same pole, these difficulties are obviated, and the power of the furnace may be practically unlimited. In this latter type the renewal of electrodes can take place without interruption of the operation, as during the removal of a single electrode the circuit remains closed through the others of the same polarity. These improvements made possible the use of the electrical blast furnace now employed by Keller, Leleux & Co.

In the English language a new name seems necessary to properly describe this type, for while it is similar in appearance and operation to the ordinary blast furnace, there is no "blast." The French *haut-fourneau*, of course, can be applied to either type.

Process of Manufacture.

In that which concerns the process of manufacture M. Keller began by employing one and the same apparatus for the reduction of the ore and its subsequent conver-

* Translation with additions by P. McN. Bennie of a paper by Charles Bertolus of St. Etienne, France, entitled, "Notice sur la Fabrication des Aciers au Four Electrique."

sion into steel. The steel thus obtained was of good quality, but the operation, while permitting of the production of the desired quality of metal, was not practical and commercial from the modern metallurgical standpoint. The production of a predetermined quality of steel, starting from the raw minerals, carried on in the same apparatus, necessitated a series of successive steps (reduction of the ores, purifying and refining) which required somewhat different conditions of operation, and in consequence careful and constant supervision. In reality, during the period of reduction the furnace is operated full of materials, the refining and purification only being undertaken after the mass has been reduced to a molten condition. In order to be entirely satisfactory for reduction or smelting purposes the furnace should be capable of accommodating a considerable quantity of materials to be treated, in which case it would not be conveniently arranged for the later step of refining. This latter operation really requires a rather shallow furnace body and that the metal should be in a state of extreme fluidity and easily accessible. These inconveniences suggested the adoption, in the process of making steel by this means, of two electric furnaces arranged *en cascade*, the upper furnace being intended and constructed especially for the reduction of the ores, while the lower furnace would be specially designed and

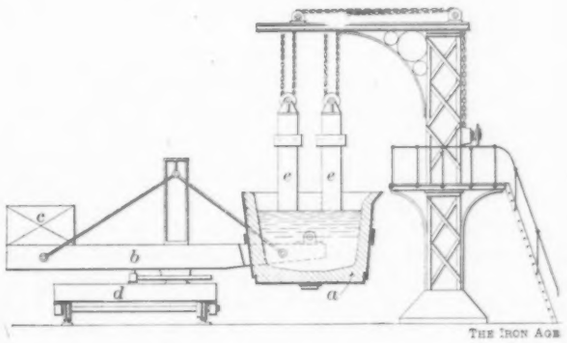


Fig. 1.—Ladle Furnace.

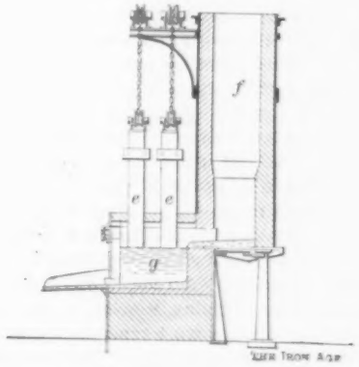


Fig. 2.—Cascade Furnace.

THE KELLER ELECTRICAL FURNACES.

exclusively reserved for the refining and purification of the rough cast metal from the upper furnace. By this method each part of the apparatus has its own special function; the superior furnace remaining always full of materials, the metal being cast at regular intervals, likewise the slag, at the tap holes arranged for these operations. The lower, or inferior, furnace thus contains only the liquid metal and the materials added for refining and purification. This method practically constitutes the Keller process, as applied at the company's works at Kerrousse. The process is carried on by means of a blast furnace of 375 horse-power, electric, of which the following is a more detailed description.

Electric Blast Furnace.

As previously explained, the French term *haut-fourneau*, or high furnace, can hardly be rendered into English, except as "blast furnace" or cupola. The Keller electric blast furnace is really two furnaces arranged *en cascade*, as described. The upper furnace contains two groups, each consisting of two electrodes placed vertically, the two electrodes of one group being in parallel, and the two groups themselves are connected in series. These four electrodes are placed in the same cavity, which forms the receptacle for the molten metal, this being lined with refractory material. The floor of the furnace is inclined toward the casting hole; the bottom is made in the same manner as the bottoms of the open hearth furnaces. The fusion chamber of the furnace is surmounted by a column of masonry, and into the shaft thus formed are fed the ores, the carbon for reduction and the fluxes, which are charged at the top. Immediately beneath the casting hole of the upper furnace the lower or refining furnace is placed; this latter furnace consisting of a chamber with refractory lining, serving simply as a receptacle for the cast metal. Into this receiving vessel, which can be closed by removable covers of refractory material, two vertical electrodes are placed, which can be raised or lowered by means of mechanism operated by hand.

At the commencement of operations the upper furnace is filled with materials, introduced at the top of the shaft until the same is filled up. The separate zones of high temperature at the end of each of the four electrodes are regulated separately by watching the four ampere meters and two voltmeters put into circuit for the purpose; this regulation can be accomplished readily several minutes after commencing. The fusion of the ores and reduction of the metal commences at the bottom. After a little while the carbonic oxide and the ores contained in the furnace shaft are sufficiently heated to commence the reaction. From thenceforward the reduction takes place, not only in the lower part of the furnace—that is to say, in the zone of high temperature—but also throughout the column of material in the shaft, which is kept filled up. The gases which reach the upper part of the furnace are conducted into a suitable chamber and there burned, the heat being used for drying material to be fed into the furnace. After several hours of operation a cast of the metal is made into the lower or refining furnace, previously heated, and already containing materials in a state of fusion. When the cast metal has been poured from the upper furnace down to the slag the sealing plug is introduced in the ordinary manner. The electric current is then suitably regulated in the lower furnace, which has just received the cast metal, in order to keep it at a high temperature, ready for commencing the decarburizing.

At the time of casting from the upper furnace the materials sink down in the charging shaft. The electrodes, which had been slightly raised for regulation of the tension, are lowered and returned to their initial position. Fresh materials are then introduced at the top.

After a certain period of operation the slag of the upper furnace is discharged by means of an opening through the side of the furnace placed for the purpose. The casts of metal and discharge of slag are effected at regular intervals during the period of operation, and the whole working of the system is regulated in the ordinary manner by examination of the slag and cast metal. It is thus possible to obtain a cast metal of uniform composition, making easier the next step of refining the metal and arriving at a uniform method of doing so.

The two furnaces receive their electric energy from the two alternators installed.

When the lower furnace has received a sufficient quantity of molten metal the process of refining it is begun. In a plant of some size, specially installed for this work, two refining furnaces could be arranged to receive electric current from the same generator. In the refining furnace the electric current is so regulated as

to obtain a complete liquefaction and rapid reaction of the metal with the refining and purifying materials introduced.

We have seen the rough metal decarburized by the well-known method of introducing an oxide into the metallic bath, the oxide being the iron ore itself. We have also seen the decarburization effected by the addition of scrap iron, which was plunged into the fused metal, between the electrodes. The purification is effected by a suitable addition of lime.

The stopping point of the decarburizing and purifying processes is determined by a mechanical examination of samples taken, as in ordinary metallurgy. After the final additions, which, however, are common to all methods and not particularly associated with the electric furnace, the casting is effected following a strong heating. The metal is run out into a pouring ladle and thence distributed in the ordinary fashion into ingot molds. Soon after the cast the electric current of the lower furnace is reduced in strength, and the furnace is ready to receive a further quantity of metal from the superior furnace, and so on. Operations thus conducted are continuous, because the method of grouping the electrodes in the upper furnace permits of their renewal without interruption of the reduction process.

M. Keller, who personally directs the manufacture which we have described, stated that in view of the relatively limited quantity of electric power at his disposal at Kerrousse he had not judged it advisable to install certain auxiliary apparatus which he has worked out for the exploitation on a larger scale of his process for the electric manufacture of steels. He assured us, however, that these auditional fixtures would permit of the casting and subsequent refining of from 15 to 20 tons of metal at one time, or a larger quantity if desired. We have also been present at one operation where steel was made direct from scrap iron. This operation requires, however, electrical constants different from those employed for the treatment of iron ore itself. A purified fusion was effected in the upper furnace and the refining and purifying carried to the same point in the furnace interior as we have previously described for the direct treatment of the ore. The treatment of scrap iron presents fewer difficulties than that of the ores and requires less electrical energy. In the manufacture of steel which we have followed, either by the treatment of the ore or by treating scrap iron, we have observed that the apparatus employed is simple and practical and permits of regular operation. We have also noted that the efficiency or yield of the apparatus is such as to demonstrate economical results from this process.

Net Cost of Manufacture.

We have verified that the manufacture of 1 ton of steel requires 2800 kw. hours—that is to say, about 3800 electrical horse-power hours. In order to determine the cost of manufacture in the case of treatment direct of the ore we will take as a basis the following prices, which can be obtained ordinarily:

Price for 1 ton of iron ore, 55 per cent. metallic iron, delivered at the factory	$2.00
1 ton of coke for reduction, delivered	8.00
1 ton of flux, delivered	3.00
Price of labor per day	.60
Price per 100 kg. of electrodes, delivered	6.00
Electrical energy per kilowatt year of 8400 hours	10.00

This last price includes depreciation of the buildings and of the motive machinery. These figures are, of course, based upon costs in France, and would have to be modified to suit local conditions in America. The ton referred to is the metric ton of 2204 English pounds.

Taking a factory of average importance, the expenses of manufacture of a ton of steel include:

a. Raw materials (ores, coke, electrodes, fluxes and special products for alloys).

b. Electric power.

c. Maintenance (general repairs, ingot molds, fire brick and refractory materials, tools).

d. Labor.

e. General current expenses.

f. Deterioration of plant, &c.

The total of these costs may be put at about 90 francs ($18) per metric ton.

We may therefore conclude that a ton of steel, manufactured by electrical treatment direct of the iron ores and cast into ingots, not including manufacturing licenses, can be accomplished at about $18 to $20 per metric ton, in round figures. Under exceptional conditions of cheap raw material and electrical energy the net cost could, of course, be diminished.

In the manufacture of steel by treatment of scrap the production of a furnace is much increased with equal expenditure of energy over the treatment of ore direct, and in consequence the electrical energy is a less important item per ton of steel produced than when treating the ore itself. On the other other, the scrap iron represents a larger item than the combined cost of the coke and iron ore. The advantage of one or the other method will depend, of course, upon the geographical situation of the plant.

Quality of Steel Obtained.

This article would be incomplete if it did not add to the previous questions of economic results something about the quality of the steel obtained. Several ingots of steel of about 120 kg. each were cast in accordance with previously described methods, and these ingots were submitted to metallurgists in the basin of the Loire for tests. The best conception of the quality of steel can probably be obtained from the report which follows:

"*Working Qualities.*—The metal was worked *au naturel*—that is to say, as received and without any tempering whatever; it behaved perfectly under the hammer, forging easily at an average temperature of 900 degrees C. about. Under these conditions it bent well, proved to be soft and workable with remarkable facility.

"A portion of the ingot having been forged and hammered without showing any faults, a strip about 5 or 6 mm. thick and 12 cm. wide was pierced while at red heat, close to its ends, by means of punches of various diameters. The fourth hole thus punched left a very narrow margin of metal at the sides, but still it did not show any alteration.

"The same portion of the ingot cut into two pieces showed a very clean fracture, denoting good quality steel.

"Another piece was then heated to a temperature of 1250 to 1300 degrees C. and showed that the metal did not stand the heat; it would not work well at this temperature, even 1000 degrees being somewhat too high and above that point the metal burned.

"*Mechanical Tests.*—The ingot having been reheated to 900 degrees C., a piece 80 x 80 mm. was forged into a round bar, for tensile test pieces of 500 mm. length and about 30 to 32 mm. diameter. This was accomplished with but one heating and very easily, demonstrating that the metal was exceedingly pliant.

"Up to this time we had been of the opinion that this was a soft steel, but this test showed to the contrary; in fact, the metal cooled slowly during the operation and was found to possess the rather curious property of becoming excessively hard at about 500 degrees C., while it worked freely at 600 to 650 degrees C.

"In order to determine the hardness we attempted to cut while cold a small piece from the test bar, but the tool was dulled without penetrating very deeply, and in order to detach the piece the bar had to be reheated.

"Chisel tests upon the small piece thus taken confirmed its great hardness.

"Tests for bending and rebending while hot upon strips of various widths and thicknesses gave very good results; the pieces were bent flat upon themselves and then rebent, without showing signs of fatigue.

"Similar hot bending tests were made transversely with equally good results.

"These tests permit us to state that the metal has considerable spring and leads us to think that the limit of elasticity should also be high.

"Following is a memorandum of the chief of tests, indicating the results as to resistance and elongation of

a test piece reheated to about 900 degrees C., this test piece having been reforged and reheated before turning:

Diameter of test piece	13.8 mm.
Length	100 mm.
Tensile strength per square millimeter (118,000 pounds per square inch)	83.4 kg.
Elongation	13 per cent."

From the above report it will be seen that the quality of steel obtained by means of the electric furnace will be found satisfactory to the metallurgist, and that the electrically made steels can enter into competition with the open hearth and Bessemer products. We are convinced that electric steels should compete successfully with crucible steels, for the reason that in the process of refining electrically the heat produced does not furnish a source of oxygen; the electric steels are thus likely to contain dissolved oxides of iron, and can therefore easily reach the quality of crucible steels. Moreover, the manufacture of steel by the electric furnace possesses, as compared with the crucible process, the considerable advantage that it may be undertaken upon a much larger scale, and it is almost certain that very soon the small crucibles, containing about 30 kg. of steel, as now employed in many steel works, will be replaced by the larger electrical crucibles, containing several thousands of kilograms of metal.

The Cie. Electro-Thermique Keller, Leleux & Cie., in view of the results above described, and understanding that this question is preganant with possibilities, have decided to install apparatus of much greater power than that now at their disposal, in order to be prepared to show within several months a steel works of considerable capacity in operation, with a view to granting licenses and furnishing apparatus for their processes.

Without going so far as Zola, who, in his last romance, "Travail," pictured to us the struggle between the heavy *haut-fourneau* and a light battery of electric furnaces, and after showing us the last cast from the *haut-fourneau* and the "Death of the Monster," decisively vanquished by the electric furnace, we are disposed to think that the electro-metallurgy of iron will very quickly assume an important position and be generally adopted in places where *La Houille Blanche* has the mastery over *La Houille Noire.*

Having mentioned some improvements which M. Keller has designed in connection with his system of furnaces, it might not be out of place to explain briefly two of particular interest. One is an arrangement whereby the refining furnace is mounted upon a truck running upon rails, so as to be movable backward and forward in front of a battery of electric blast furnaces, thus serving the whole battery. (See Fig. 1.) By this plan the refining furnace really becomes a huge ladle of special design, which can be moved quickly into position at any of the reducing furnaces ready to cast. After the metal has been run the refining furnace is then placed underneath the electrodes, which are inserted, current turned on, and the process of refining carried out. In this way the refining furnace is in almost constant service, introducing a considerable factor of economy into the process. Now that the utilization of blast furnace gases is a live question it is not a far step from their use to drive gas motors, electric generators, &c., to the usage of the electric current for refining cast iron at the blast furnace itself and producing good quality steel. Surely this must be an alluring prospect for some of our enterprising American blast furnace operators.

Another improvement is an arrangement whereby the refining furnace is operated in conjunction with the ordinary foundry cupola. This plan also presents possibilities to American founders in localities where electric power may be had at reasonable figures. (See Fig. 2.)

Indeed, its application need by no means be confined to places having hydraulic installations, and this very question might be found an interesting and profitable one for combined study by our foundries and electric light people. An arrangement whereby the current could be supplied to founders for the conversion of cast iron into steel during the periods of light load at electric light stations might help to solve the vexed question of taking off the peak of the load curve by the satisfactory method of moving the rest of the curve up to the peak. Under such conditions power could doubtless be supplied at prices which would pay founders and light companies.

Excess Duty on Steel Blooms Refunded.

An Echo of the Boom of '79-80.

WASHINGTON, D. C., December 9, 1902.—After a period of 20 years, Congress has finally passed a measure of interest to a large number of iron and steel manufacturers, granting them the privilege of bringing suit in the Court of Claims for the recovery of duties, aggregating nearly half a million dollars, illegally exacted on steel blooms imported by them between the years 1879 and 1882. The bill, which thus affords a measure of tardy justice, originated in the Senate and was passed by that body during the first session of the present Congress. It provides as follows:

Be it enacted, &c., That jurisdiction be, and is hereby, given to the Court of Claims (notwithstanding any statutory bar or limitation, and notwithstanding the requirements of the statutes as to payment under protest, appeal to the Secretary of the Treasury, and notice of suits before bringing suits ordinarily in such cases, as prescribed in Title XXXIV (collection of duties), Chapters 6, 7 and 8, Revised Statutes) to hear, try, determine and render judgment as in an original suit, with right to appeal as in other cases, the claims of J. F. Bailey & Co., H. E. Collins & Co., Edgar Thomson Steel Works, Limited; Carnegie Brothers & Co., Limited; James Lee & Co., Downing, Sheldon & Co., R. F. Downing & Co., Albany & Rensselaer Iron & Steel Company, Joliet Steel Company, Cleveland Rolling Mill Company, O. L. Garrison, for Vulcan Steel Company and St. Louis Ore & Steel Company; St. Albans Iron & Steel Company, Godeffrey & Co., for the Albany & Rensselaer Iron & Steel Company; Oliver L. Garrison, A. E. Godeffrey & Co., James Johnston, Clarke, Post & Martin and Post, Martin & Co., agents for Springfield Iron Company of Springfield, Ill.; Charles W. Matthews, Harry C. Arbuckle and Brown Brothers & Co., agents for Charles W. Matthews; E. Samuels & Co., Henry W. Oliver, Jr., A. H. Childs, agent for Henry W. Oliver, Jr.; Lewis, Oliver & Phillips, Schrader & Ellery, Peter Wright & Sons, agents for Cambria Iron Company; Diamond State Iron Company, Interstate Improvement & Construction Company, Baltimore & Ohio Railroad Company, agents for Interstate Improvement & Construction Company; Charles H. and Eugene Odell, agents for Sandusky Rolling Mill & Mfg. Company and Northern Pacific Railroad Company: Northern Pacific Railroad Company, Drexel, Morgan & Co., A. H. Barney and Robert Garrett & Son, agents for Northern Pacific Railroad Company; E. S. Wheeler & Co., and Edgemoor Iron Company, for refund of import duties paid by them in excess of the duties imposed by law on steel blooms imported by them during the years 1879 to 1882, both years inclusive; and the Secretary of the Treasury is hereby authorized and directed to pay, out of any money in the Treasury not otherwise appropriated, the amount of such judgment as shall be rendered by the Court of Claims under the provisions of this act: Provided, That the adjudication shall be for such sums only as were paid in excess of legal duty; and provided further, that their petition shall be filed in said court within six months after the passage of this act.

The facts with regard to the claims provided for in this bill are of unusual interest. As stated by Chairman Graff, who reported the bill from the Committee on Claims, it appears that during the years referred to a large number of manufacturers, requiring raw material in excess of the domestic supply, undertook to import steel blooms, at that time a form of imported steel for which there was no unquestioned classification. The customs officials assessed duty at the rate of 45 per cent. ad valorem, but the importers claimed that the blooms were dutiable at 30 per cent. only. These importations took place before the organization of the present Board of General Appraisers, and owing to peculiar conditions in the customs service many of the manufacturers were prevented from filing formal protests by the action of certain officials who, according to Mr. Graff's statement, "threatened that if they insisted upon prosecuting an appeal, and were not content with the adjudication, still higher rates would be imposed." One importer, however, took this risk and carried his case to the United States Supreme Court, which reversed the decision of the customs officials and declared the blooms to be dutiable at the lower rate. In the meantime, however, the statute of limitations had operated to bar the other importers from suing for recovery in the courts and they were therefore forced

to apply to Congress for relief. A bill was drawn similar to the measure above quoted, and has been many times favorably reported in one House or the other, but heretofore has never received the favorable action of both Houses in the same Congress.

The action of Congress in this case is a notable illustration of the extraordinary difficulties that beset the path of the individual seeking to recover his just dues from the Government by special legislation. With the history of this bill well known, it required an hour's sharp debate to bring it to a vote in the House and it was strongly opposed by Chairman Payne, of the Ways and Means Committee, by Chairman Hepburn of the Interstate Commerce Committee, and by a number of other Representatives who interposed technical objections to its consideration. The most remarkable objection to the bill was raised by Representative Payne, who declared that the Government would be deprived of its defense by the terms of the bill for the reason that all the evidence in the case was a matter of official record and could not be controverted. This technical objection drew from Representative Sibley of Pennsylvania a warm rejoinder. He said:

> The gentleman from New York is at the head of the great committee that fixes the tariff duties of the United States. Now, when the importers of products into the United States have paid a higher rate of duty than the law provides the money to be refunded to them is simply an act of justice, which I trust the chairman of that committee will not deny. He is the last one that ought to stand up and object to a strict construction of the law—the proper rate of duty to be assessed on imports into the United States. I am astonished that the distinguished gentleman should object to this measure.

Mr. Payne still contended that the bill was improper, but Representative Dalzell, the ranking member of the Ways and Means Committee, and Mr. Payne's chief lieutenant, strongly advocated the passage of the bill. He said: "Two things are absolutely sure, two facts that cannot be denied. First, there is in the Treasury of the United States money illegally collected by the United States officers from citizens of the United States: second, that money has been in the United States Treasury ever since 1889." Mr. Dalzell further pointed out that no provision was made for interest on the illegally exacted duties, the bill providing only for repayment of the original sum. Representative Grosvenor brought the bill to a vote in a stirring little speech in defense of the claimants, in which he said: "All the facts in the case stand admitted. First, the importation; second, the overcharge; third, the payment; fourth, that it has never been paid back. It is the money of the importer in the pocket of the Government, and it ought to be refunded in the shortest possible process that an honest man would refund money under like circumstances."

The bill was finally reported favorably to the House by the Committee of the Whole after an amendment requiring the claimants to go to Congress for an appropriation to meet the court's judgment had been rejected, and was then passed without a division. The papers in the case will speedily be filed in the Court of Claims, and as the facts are of record and the law has been construed by the Supreme Court, there should be little delay in obtaining judgment. W. L. C.

Titanium in Cast Iron.—In an address before the Railway Club of Pittsburgh on car wheels, C. V. Slocum, president of the Keystone Car Wheel Company, says: Much interest has developed in the experiments made at Niagara Falls last year, and again this summer, conducted by A. J. Rossi, in the electrical smelting of titaniferous ores. Iron containing titanium is known to be of great value in car wheels, having the effect of hardening the treads and strengthening all parts of the wheels, including the plates, but the real or imaginary difficulty of smelting titaniferous ore has prevented its general use up to the present time. Mr. Rossi, however, has been indefatigable in developing this element. The writer has a letter under date of September 5, 1902, from Mr. Rossi, in which he states "all the objections against titaniferous ores seem to have been destroyed one after the other." In a number of experiments I have melted in a crucible a great number of mixtures with various fluxes at temperatures below those attainable in a blast furnace. "As you can remember, the slags at Buffalo contained from 30 to 35 per cent. titanic acid. Analysis shows from 0.30 to 0.70 silicon, with sulphur as low as 0.047, and phosphorus below the Bessemer limit. Both irons contain carbon in combined and graphite state, although in the white pig it is nearly all combined." Our own experiments with the metal demonstrate that titanium in iron gives greater density to the metal, surprisingly increases transverse strength and gives a harder chill or wearing quality in the wheel. This is no light statement, when it is remembered that the tread, or wearing surface of a car wheel, is already harder than steel—in fact, a rough section of chilled car wheel iron will cut glass.

The National Eight-Hour Bill.

WASHINGTON, D. C., December 9, 1902.—The Senate Committee on Education and Labor, before which is pending the so-called Eight-Hour bill, has held three meetings on that measure within the past week, devoting a session on the 5th inst. to hearing witnesses in opposition to the proposed legislation, including a delegation from the National Manufacturers' Association, composed of Messrs. A. B. Farquhar of York, Pa., the well-known manufacturer of agricultural implements; Millard F. Bowen, secretary of the Manufacturers' Club of Buffalo, and Summerville Baldwin of the Warren Mfg. Company of Baltimore, Md. Secretary Cushing of the National Manufacturers' Association also made a brief statement to the committee, and Judge Joseph K. McCammon, representing the Carnegie & Bethlehem Steel Company, &c., was present and took part in the examination of the witnesses.

The feature of the hearing was the declaration finally made by Chairman McComas, that in his opinion the bill would not affect any manufacturers of goods usually purchasable in the open market, even though made for the Government under contract providing peculiar specifications. This statement by the chairman of the committee did not appear to be relished by the labor representatives present, presumably for the reason that it deprived the bill of much of its effectiveness, but it is of course an open question whether the courts would construe the measure along the lines indicated by Senator McComas.

Argument by A. B. Farquhar.

Mr. Farquhar, who was the first witness, called attention to the fact that the bill had been passed by the House "with little or no opposition after little or no discussion." If the eight-hour day imposed on manufacturers by force of law would be a good thing on the whole, it might be advisable, he said, to consider the proper method of bringing it about, but if the shorter workday was not desirable or if the compulsion of law was not the right agency to bring about the move, in either case the bill was radically wrong and should be unconditionally rejected by the Senate. Continuing, he said in part:

"It is a very moderate statement of fact, as all must admit, that the superiority of the eight-hour day over one extending to nine or ten hours in mechanical work has never been proved. The welfare of the community—and especially of the poor, to whom cheapness of purchased goods is a vital matter—depends upon economical production; and that so far as mechanical appliances enter, requiring greater expenditures of fuel and time in heating furnaces, getting up steam and setting every wheel in motion, cannot be attained by short heats and long rests. On the other hand, the productiveness of the operator himself, increasing almost proportionately to the time employed for a limited number of consecutive hours, finally reaches a point which cannot be exceeded without depleting his vital forces. The balance must be struck somewhere. In my youth 12 to 14 hours a day was often the rule in machine shops. With inventions and other improvements mechanical work has become easier and more interesting, so that men could

profitably work longer without injury now than then; yet the working day has been reduced to ten hours and labor now done in our factories brings far less physical exhaustion than it did fifty years ago. We can scarcely claim to have conclusively shown that the old scale of hours was hurtfully long, much less that our present ten hours are excessive.

"It is unquestionably true, I believe, that the workman in this country is more efficient by a high percentage than in any other country. It is true also that it is largely due to that superiority that our manufacturers are able to hold their own so well in European markets. If we deprive ourselves of this advantage or permit the unions here, as already in England, to deprive us of it we shall cripple our power to meet foreign competition; and not only that, but our laboring people here as in England must pay the cost of our error in depleted wages. It is an unshaken, eternal truth that capital cannot be attacked without attacking the laborer, for the interests of the two in the long run are identical.

"But the bill before the Senate should be rejected even though the end proposed were right in itself, for the way of attaining that end is wrong. The bill is blind to the difference in different kinds of service, reducing all in its socialistic prescription to one dead level. The bill is blind also to the dozens or hundreds of possibilities of delay that confront the manufacturer, particularly when, as is usual in Government contracts, the work is somewhat out of his customary lines of activity. Such delays are met at present by overtime work followed by relaxation when the contract has been filled and the stress is over; but under this law they could be met by no such means, the manufacturer being forced to the choice between a penalty incurred by failure to complete his work at the appointed time and a penalty incurred by violating the eight-hour law. It is quite clear to my mind that few or no manufacturers would undertake Government work at the same time with work for other customers under such conditions."

Other Arguments in Opposition.

Mr. Bowen, the next witness, said that the chief objection to the bill in the minds of the members of the Manufacturers' Club of Buffalo was that it would seriously disarrange business interests throughout the country. Some of the members of the club were engaged partly in the manufacture of goods for the Government and partly on private work, and their entire force would be compelled to work eight hours a day, whereas their competitors who had no Government work would be running their plants longer hours and producing on a more economical basis.

At this point Chairman McComas made a statement regarding the character of the bill, which would seem to foreshadow beyond a doubt his own action in voting for a favorable report upon the measure. He said, in part: "The examination I have made and these hearings have taught me that this measure is only tentative and not far-reaching to the degree that nine-tenths of the people who have not studied it carefully think it is. I want to admit that it will very directly concern the builders of ships and the makers of armor plates; but if I only knew the products of the various members of the Buffalo Manufacturers' Club and should apply to them the exceptions in this bill I would expect to find that a great many of them are not necessarily reached by this measure. An infinite variety of things are made now and furnished the Government which are not affected by this bill, including all the great mass of things which may be produced for the open market."

Judge McCammon here raised the point as to whether the bill would exempt goods made under a contract provided it was possible to purchase similar goods in the open market, and said there was much doubt on the subject, especially because the Government bought nothing to speak of in the open market. The chairman then expressed the opinion that if the contract in question covered goods to be manufactured after it was awarded it would be covered by the bill and the goods would have to be made on an eight-hour basis. Subsequently, however, Senator Clapp of the committee expressed the belief that no matter when the goods were made, they would be exempt provided similar goods could usually be purchased in the open market, whereupon Senator McComas indorsed this view of the measure. On this point, Mr. Bowen said:

> While contracts for the sale of such goods may in some sense be considered contracts simply for their sale and not for their manufacture, yet they clearly do involve the manufacture of the goods. The very object, for instance, of a firearms manufacturing company in securing a contract for the sale of guns to the Government is to provide business for the manufacturing department of the concern The carrying out of such a contract necessarily requires and involves the employment of laborers and mechanics, and by the precise language of the statute such a contract imposes upon the corporation making it the obligations contained in the proposed law, to the effect that no laborer or mechanic employed on any part of the work contemplated in the contract shall be required or permitted to work more than eight hours in any one day. The attempt to relieve such a contract from the obligations imposed by the bill by reason of the fact that some of the goods used in filling it may be taken from stock, seems to be illogical. Certainly the framers of the bill did not so understand the meaning of the provision in question. Nor do I think that such a distinction would be sustained by a court.

Mr. O'Connell, the president of the International Machinists' Association, who was present, then stated that if he could be furnished a list of the members of the National Manufacturers' Association he would undertake to prove that a large number of them were running their plants on an eight-hour basis, to which Secretary Cushing replied that such proof could not be furnished for the reason that the alleged facts did not exist, but in reply to a question from Chairman McComas he stated that the association did not regard it advisable to publish lists of its members at the present time.

The last witness was Summerville Baldwin, a cotton duck manufacturer, who asserted that the passage of the bill would absolutely prevent his firm from bidding on Government work. Chairman McComas interposed with the suggestion that if the goods could be bought in the open market the bill would not apply to them, to which Mr. Baldwin rejoined that the result would then apparently follow that jobbers and others would be able to sell to the Government while manufacturers themselves could not and the Government would be obliged to pay two or three profits. Senator Clapp insisted that as long as similar articles could be bought in the open market a manufacturer could produce them after the signing of a contract and still be exempt under the proposed bill. Mr. Baldwin replied that if he could make cotton duck for the Government on a ten-hour basis he would be satisfied so far as he was personally concerned, but that to permit him to work ten hours while his neighbor, manufacturing something else for the Government, was limited to eight hours was a clear discrimination wholly unwarranted.

Upon the adjournment of the committee the chairman announced that the hearings would close on December 12, and that it was his purpose to report the bill, "with or without amendment, favorably or adversely" before the holiday recess for which Congress will adjourn on the 20th inst. W. L. C.

The extension of the railway from Gellivare, via Kiiruna to Narvik (Ofoten, Norway), is now completed, and the first trainload of iron ore left Kiiruna for Narvik on November 15. This extension of the Lulea-Ofoten railway has taken four years of hard work, and has been finished within the contract time. Shipments from Narvik start in January next.

The Standard Oil Company will during the next few days complete their natural gas pipe line into Cleveland, where domestic consumers are to be supplied at the rate of 30 cents per 1000 cubic feet. The line pipes the gas from the West Virginia oil and gas fields at Proctor, W. Va. An additional line will probably be laid next year.

The announcement is made that the Grand Trunk Railway is to be carried through to the Pacific Coast by a new corporation, the Grand Trunk Pacific Railway Company. The undertaking involves the building of 2500 to 3000 miles of line.

American Society of Mechanical Engineers.

The Metric System.

The paper by F. A. Halsey on "The Metric System," abstracts from which we presented in our issue of last week, brought out a long and animated discussion, which occupied the entire sessions of Wednesday afternoon and evening. Mr. Halsey attempted to prove that the metric system had proved to be a failure, even in those countries—particularly France and Germany—in which its use had been compulsory for many years. He also endeavored to show that its employment as the standard of weights and measures in this country would be inadvisable, and would certainly not meet the wishes of those engaged in the manufacture of machinery.

This discussion, a portion of which follows, proved that there are many eminent engineers who firmly believe that the decimal system is admirably suited to the needs of this country, and that its adoption would be of material benefit.

Discussion.

J. H. Southard, chairman of the Congressional Committee on Coinage, Weights and Measures, said it was no matter what the source of a good system was, whether French, German or Spanish. He illustrated this by the story of the old lady who dropped down on her knees one night and prayed for bread. A neighbor not of the best reputation heard the prayer, and thought he would answer. So he climbed upon the roof and dropped a loaf of bread down the chimney, and it fell at the old lady's feet. She immediately thanked the Lord for so quickly answering her prayer. The neighbor did not relish this, and, walking in, said: "The Lord didn't have anything to do with that bread, I brought it myself." The old lady in reply said, "It makes no difference; the Lord sent it, even if the devil did bring it." So added the speaker, it makes no difference whence good comes provided it is good. What we need is a universal system. In the investigations made by the committee upon this subject it was known that scientific men were in favor of the metric system, and as the committee wanted the views of those opposed to the system invitations were sent to Brown & Sharpe, Pratt & Whitney, Baldwin Locomotive Works, and so on, in order to give them an opportunity to present their side of the argument.

The bill now before Congress is not in any sense compulsory. It is merely for the use of the Government in its several departments with the single exception of the Coast and Geodetic Survey. The omission of this department was explained by the fact that it was thought better to complete this survey, which is now nearing its end, in accordance with the standards of measurement heretofore used. The Government desires to try the metric system first and to see how it works, the aim being to bring about uniformity among the several departments. If it is found to operate to advantage then it may serve to popularize the system. The decimal system is bound to become universal, and the tendency of the world is toward the metric system. Have you ever heard of a country adopting the metric system and then going back to the old? I believe that the metric system will come just as surely as the tide rises and falls.

Mr. Southard quoted the opinion of United States Attorney-General Knox as to the scope of the bill. In the opinion of the Attorney-General the bill affects the departments of the Government, and has absolutely no influence upon manufacturing concerns independent of the Government. It is not compulsory and is not intended to be compulsory in any way, and, in order to demonstrate that, it carries no penalty for violation.

Mr. Halsey said: "There are two parties to a contract. Does this measure apply to those doing work for the Government? Also must their machinery be made to metric measurements?" In reply, Mr. Southard said: "Can't you duplicate a machine according to the methods you now employ, and without changing a single step in the operations, and then by a simple process and without much labor measure it by the metric system." He further explained that the Government has no intention and has no right to say how any particular machine shall be made. So that, therefore, it makes no difference to the Government as to what system is pursued in manufacturing.

S. W. Stratton, Director of the Bureau of Standards of the United States, spoke strongly in favor of the metric system. Concerning consular reports and the fact that measurements in these reports were almost always in the English standards, he explained that it was the custom to translate into our system of weights and measures from the one in use in the country reported from. He thought there was need for a universal system of measurement. In his experience of over 20 years the vast superiority of the metric system had been demonstrated to his satisfaction. There is no trouble about attaining that system and it is by no means complicated or difficult of apprehension. The two systems are now in common use in this country, scientific men now using almost exclusively the metric. In the speaker's opinion it would be more difficult to do away with the metric system in this country than with the present system of measurement. It was further explained that the Government has never made laws except for its own use, and if the metric system is made compulsory in this country it will be by the States. To obtain foreign trade we must talk in the language of the country in circulars, measurements and so on.

F. J. Miller, editor of the *American Machinist*, said in part as follows: In commenting upon this paper I do not propose to present the argument for the metric system, but simply to call attention to the fact that there is such an argument. So far as the records of this society go, I believe they do not show that there is any argument in favor of the metric system. Every paper that has been presented upon the subject has been against it, and the only committee that has ever been appointed by the society to do anything in connection with the subject of the metric system is composed exclusively of strong opponents of the metric system—men of great ability, it is true, but making up a committee which by its constitution is utterly unable and in fact does not intend to give the subject impartial consideration. [The report of this committee referred to by Mr. Miller will be found elsewhere in this article.] Of course this society is not organized to advance or to repress certain proposed reforms, but rather to get at and present the facts regarding any question that may come before it, and in order to do that it must obviously consider what may be said on both sides. That, it seems to me, has not been done, and what I shall have to say, therefore, will be for the purpose of showing that at least there is an argument on the other side which we ought to consider before putting ourselves on record.

Mr. Halsey opens his paper with a citation of the fact that scientific and practical men of the front rank, and many engineering, scientific and trades societies, are calling for the passage of the bill now before Congress, looking to the partial adoption of the metric system in the various departments of the Government, and he names several men who are well-known engineers, members of this society as well as others, who favor the bill and the adoption of the system. Now any one who will take the trouble to look up the records will find in every case where such societies as the Western Society of Engineers, Franklin Institute, Engineers' Club of Philadelphia, &c., have taken action upon this question they have done so only after a special effort to bring out all the arguments possible on both sides and to carefully consider those arguments. Does it not seem the part of wisdom for this society to pursue the same course—the truly scientific course—before attempting to decide? Must we conclude, as the author of the paper would evidently have us conclude, that all these well-known men and societies are simply blinded and that only he and others who oppose the metric system can see?

I pass over the fact that gems are weighed by the carat in metric using countries, and that expressions both for and against the metric system may be extracted from the famous report of John Quincy Adams,

as being comparatively unimportant, and will confine myself to the consideration of what people of to-day are doing and thinking about this question, people who for the most part are directly connected with the business and art of producing machinery. This cuts out all that Mr. Halsey has to say about the great confusion that exists in the textile industries of Europe. All that is said in the paper on that point seems to show simply that there has been no compulsion with regard to the use of the metric system in the textile industries of Europe and that they are, therefore, using the numerous standards that were in use before the introduction of the metric system. To say that this confusion is caused by the metric system is to remind one of what the boy said in his essay upon salt. He said: "Salt is what spoils your potatoes when you don't put any on." In like manner the metric system produces great confusion in the textile industries of Europe when it is not used.

Foreign Drawings in Metric System.—We, however, are more interested in this matter as it applies to the construction of machinery, and in this connection I beg to say that during the past 15 years we have received in the office of the *American Machinist* many blue prints made in the drafting rooms of European machine shops. Not one of these blue prints has been based upon an ell of any kind or value, nor upon an inch of any kind or value. All of them have been figured in millimeters, and so far as I recall not one of them has had upon it the decimal or other form of fraction.

Metric System in European Shops.—I have spent considerable time in inspecting and studying European machine shops and never encountered any other than the metric system in any of them. This is not to be despised as negative testimony, but on the contrary proves, I think, that there is a practically general or almost exclusive use of the metric system in European machine shops. And I think the conclusion is a fair one that the system has come into use in those shops because it has been found to be a good system for the purpose and because it has been found advantageous to use it rather than any other, for, as Mr. Halsey has himself shown, there is no effective compulsion about it, and the machinery builders of Europe could have undoubtedly gone on using their own mixture of standards, just as the textile men have done, had they chosen to do so; or, in other words, if they had not been open minded enough to perceive that the new system offered advantages that made it worth while to adopt it.

Slide Rules Decimal.—The author's reference to the slide rule in an argument against the decimal system is, it seems to me, unfortunate for him. Slide rules are decimal, made so, I believe, because that is by far the more convenient system, and in handling common fractions by their aid it is necessary first to convert the common fractions into decimal fractions and then at the finish convert them back again if the computator thinks he must have the answer in common fractions.

Willans Engines.—Most of us know of the firm of Willans & Robinson of Rugby, England. Many of us have been in their establishment and know that this firm are not likely to be found pursuing will-o'-the-wisps, or in fact doing anything that is not strictly practical. No metric law has been passed in England and no one ever tried to compel this firm to adopt the metric system. Yet they have virtually adopted it voluntarily and simply because they have found it advantageous to do so and to continue in its use. Their earlier engines were designed to the inch system and tools and fixtures made for them. They still continue to build their engines to that system, but along with them and in the same shop they build other later designed engines to the metric system, and their testimony is unqualifiedly in favor of the latter system.

Captain Sankey, who is a director of the company named, read a paper before the Institution of Civil Engineers in 1897 in which he stated in effect that of the two systems, in use side by side in the same shop and doing similar work, the metric system was much the better liked, both for the shop and for the drafting room. In his paper he went into details and gave the reasons for the preference at length. Testifying before a Parliamentary committee on this point Captain Sankey was asked:

Q. Have you found any difficulty with your workmen in this respect? A. Absolutely none.

Q. Do they adopt it and see the advantages of the system? A. I should say so. In fact, in connection with my coming here this afternoon I asked four or five or our men privately (not through the works manager) what they thought of it and there was not a dissentient voice among them. They all agreed at once that the millimeter was very much easier to work to than the English measurement.

Q. I understand you found your men had not the slightest difficulty in adapting themselves almost immediately to the new system? A. Not after the first few days. I asked that very question of the head of our tool room and he said it was a little awkward for a time. I said, "About how long?" and he said, "Two days."

Lord Kelvin.—Lord Kelvin said before the English committee: "I believe that the difficulty of making the change has been enormously exaggerated. I believe that in a fortnight people would become so accustomed to the perfect simplicity and easy working under the metric system that they will feel that instead of its being a labor to pass from one system to the other it will be less than no labor. That is to say, it would be a great saving of labor after the first day or two of beginning to use the metric system."

Sir Benjamin Baker.—Most of us know Sir Benjamin Baker, the builder of the great Forth Bridge in Scotland. He says, in speaking of this subject: "I am equally familiar with both systems, in consequence of having carried out works abroad, and when I return to this country [England] from such work and experience with the metric system I think there is nothing more foolish in this world than our weights and measures."

I do not believe that any machine builder will throw away any tools or fixtures on account of this proposed law. He will wear them out building machines, some of which machines may go into the Government shop just as they do now. But when it comes to designing an entirely new machine he will, if he feels inclined to do so, design it to the metric system, and I have presented testimony from those whose experience ought to enable them to know all about it to the effect that the draftsmen and the men in the shop will not be bothered or perplexed by that, but on the contrary will care little about it; or will be pleased with the change and find it advantageous in their work.

James Christie, chief engineer of the Pencoyd Iron Works, said:

Mr. Halsey's interesting paper imparts fresh interest to a subject that has been worn so threadbare in the past that it seems almost superfluous to revive the stale arguments that have been repeatedly advanced. The discussion might be considered closed, the question called for the ayes and nays to decide, to be or not to be, as the popular voice will determine. An excuse for the renewal of the argument, however, will be found in Mr. Halsey's paper, which attacks the subject from the standpoint of a quarter of a century subsequent to the legal and compulsory introduction of the metric system in the German Empire. Mr. Halsey claims that there still linger in certain of the arts remnants of the ancient systems that were formerly in vogue.

Thirty years ago, during one of the periodic revivals of the subject of the metric system, this being the earliest date that the writer of this discussion has any personal knowledge of, it will be remembered that exactly similar arguments were applied regarding the popular customs in France, urging that although the metric system had been enforced almost at the point of the bayonet, yet they had not been able to eradicate the old conflicting and cumbersome systems of France, more especially in the agricultural districts. Often attempts are frequently made to enforce upon a crude society civilized methods for which they are not yet fitted. The enthusiastic promoter of civilization is apt to overlook this difficulty, an illustration of which is offered in the well-known story of the tropical planter who, weary of seeing the negro laborers in the field bearing their

cane burdens on their heads, endeavored to lighten their task by the substitution of a convenient wheelbarrow, the final result being that his slaves insisted upon carrying the wheelbarrow with its burden on their heads rather than to alter their habits and wheel the vehicle on the ground.

Present System Not Survival of Fittest.—Notwithstanding the arguments so frequently urged that our existing methods of weights and measures are a natural survival of what has been found fittest, we can point to numerous illustrations for which there can be offered no well founded reason, except that we have inherited them as a legacy from the past, and it is too much trouble to make a change.

What good reason can be offered for the continuance of the hundred weights and quarters interposed between the pounds and tons, still in common use in Great Britain, although almost entirely obsolete here? The expression is cumbrous and laborious to write and read or to multiply, and with our American tendency to take short cuts we wisely allow them to fall into disuse. What convincing arguments can be offered for the continuance of the ton of 2240 pounds? Inconvenient and useless from every point of view. The net or short ton, as we call it, of 2000 pounds, is in common use with us, both in our customs and our literature, and would have long since displaced its predecessor if the former had simply been made illegal. We find it a growing custom to omit the use of the ton entirely. It is common and growing practice to refer to large quantities in many millions of pounds. When we ask why burden yourself with so many figures, the reply is the uncertainty of what ton means. If the ton was 2000 pounds we would gladly use it, but the ton of 2240 pounds involves more labor and more uncertainty in the knowledge of the result than stating the terms in pound quantities.

Textile Units.—It will be observed that the examples offered by Mr. Halsey are chiefly drawn from the textile arts. In this manufacturing industry inherited terms probably enter more largely than in any other into the vernacular of the humblest mass of the people.

Our National Currency.—Immediately after the adoption of the Federal Constitution, Gouverneur Morris and Thomas Jefferson began the agitation for the adoption of a national currency. The need of some coherent national system was very pressing, considering the heterogeneous character of the monetary units prevailing at the time, which were a jumble of English, French and Spanish coins, each with its own name and measure of value. Morris and Jefferson were both of one mind that the currency should be of a decimal character. They only differed in the details of the application. The arguments presented by these eminent men for the decimal system indicated that they fully realized its simplicity of comprehension and enumeration. The arguments against the decimal system were quite similar to those advanced by the metric opponents of to-day. I think this generation is all of one mind, that there was no mistake made in adopting our decimal system of monetary units. It was readily adopted and received the approval of the intelligence of the country, yet notwithstanding this, it is well known that it was over half a century and the old generation had passed away before the ancient terms fell entirely into disuse.

The retention of ancient terms or phrases in exceptional quarters bears little significance to this subject, from the point of view under discussion. On the other hand we have the most convincing evidence that the metric system is now exclusively established in literature, in science and in engineering and in the mechanic arts of France and Germany. We frequently find British units paralleling the metric in German and Belgian trade catalogues and tables. This is necessitated by the constant international exchanges, and is regretted by the manufacturers, who complain of the cumbrous conversion involved with the British units as compared to the simple notation of the metric system. An eminent German engineer and metallurgist remarked to the writer a few years ago: "To us the advantages of the metric system appear so natural and self evident that the arguments offered by its opponents in Britain and America seem ludicrous; and our only wonder is that so practical a people as the Americans hesitate so long to participate in its advantages."

Quick Methods Demanded.—A distinguishing feature of the present time is a tendency to adopt quick methods and take short cuts to accomplish a desired result. Business letters are short and terse. The shortest words are preferred that will express the intended ideas. The gradual extension of phonetic spelling is removing unnecessary letters from words. The ponderous phrases and sentences of our ancestors are disappearing from our literature. We want the best, the most efficient tools and we expend much on reducing the manual movements of those who handle them. We waste little sentiment in preserving obsolete and inefficient tools, but consign them to the scrap heap with as little reluctance as we send worn out garments to the rag man. Our systems of weights and measures form the most important instruments at our command in making just and accurate exchanges. They should be the best to be obtained, and if found wanting they should, with due care and caution, be improved to conform to the needs of modern society. It is very true that it is a serious matter to alter existing standards, and the subject should not be entered upon lightly, but only after prolonged and careful study. It is doubtless quite feasible to make desirable changes in our present systems relating to mass and volume, without at all affecting the elementary principles on which they are founded.

Arabic System.—Reflect for a moment on what a convenient and useful method we possess in our Arabic system of numerals. How clear, concise and expresive it is as compared to the Roman system, or any other ancient system it displaced. Each figure, reading from right to left, expressing a decimal advance, units, tens, hundreds, thousands, &c. Without this instrument our arithmetic and technical education and literature would be almost impossible. It is difficult for us to understand now that it took many centuries to graft this into our Christian civilization. Only after the art of printing was established and its adoption became imperative was the Arabic system completely adopted in Europe. The metric system is essentially an extension of the principles of the Arabic numerals, from quantities in general to quantities in detail, to weights and measures. It is therefore essentially a decimal system so long as we have a decimal notation.

Civil Engineers Favor Metric System.—Among civil engineers it seems probable that a majority favor the system. In the class of mechanics and mechanical engineers it is probable that the majority would decide adversely at the present time, and not many years ago the writer of this discussion would have felt tainted with a mild form of heresy if he had ventured to advocate the doctrine among his professional brethren. We do not want to be in the ranks of a hopeless minority, and the knowledge of the existence of a goodly company among our mechanical brethren and the gradual but constant increase in the numbers serves to stimulate those who might otherwise be faint hearted on the subject. A confession of faith, with some reasons therefor on the part of the writer, might be offered in extenuation.

Trouble with Feet and Inches.—An old and never ending trouble with our linear measures is the confusion frequently occurring between feet and inches. We can all recall errors of misunderstanding arising from the reluctance of draftsmen to place a distinct foot symbol between the figures for feet and inches. Some offices require all dimensions to be given in inches alone. The objection to this is that it imposes labor and chance of error, in workmanship, as when measurements of several feet are involved the workman must make the conversion before he can take his measurements. The best practice is to place a distinct vertical dash for the foot mark, a horizontal dash to mark the distinction between feet and inches. Counting these two dashes as approximately the equivalent of one figure, we can tabulate the number of figures required to denote given dimensions by either system.

Consider the relative clearness and facility for interpretation of the drawings. Our usual scales of reduction down to 1 inch per foot (one-twelfth size), excepting

¾ inch per foot, are readily measured by the draftsman or examiner by the standard rule, in the absence of the reduction scale, although not so readily in general as when the reduction is a decimal one. But when the plans are drawn to scales of ¾ or ⅜, or worst of all 3-16 or 3-32, inch per foot, the perplexity begins, and generally results in the draftsman's searching or turning and twisting with his triangular scale to find the measure required. When we have the plans plotted by the surveyor for the building areas we propose to use, and he usually has sensible scales, 10 feet to the inch, or desirable multiples thereof, then one's heart is gladdened at once, as no reduction scale need be sought. Our pocket rule usually applies to the case, and we obtain the desired dimensions with ease. So also with drawings from metric scales. Most of these can be interpreted at a glance by the standard metric rule, and any of them with little effort.

It is urged by the opposition that the units are inconvenient, being too large or too small for facility of application in the workshop. I cannot answer for this objection, as a faithful endeavor, extending over many years, has given no satisfactory evidence of any substantial difference between the conveniences of the respective scales. The decimal system is not capable of continuous binary division, and that is one of the disadvantages of a decimal notation, and offers a good argument for those who propose to make 12 the radix of our system. A duodecimal base has many unquestionable advantages, if it would be possible to obtain it without a revolution of a sweeping and destructive character. On the other hand, with a purely decimal system the necessity of binary division is not so great as at first appears. It practically disappears from technical literature, and remains largely a popular expression, as exemplified with our currency system, without any confusion or inconsistency.

When we consider the difficulty of making a change in our system of measurements we must all concede that there would be a period of some confusion and incidental expense during the transition period. Undoubtedly this burden would fall largely on machine shops. Perhaps in no other department of industry would it be of such serious moment, but even in the machine shop it is probable that the immediate necessary outlay would not be so great as is sometimes urged. If all our tools, gauges, &c., had to be instantly discarded *en masse* the proposition would be a serious one. It is not believed, however, that any such procedure would be necessary.

Two Standards.—As the matter now stands we seem to be gradually working toward two standards, one used in scientific and semi-scientific work and the other in the practical affairs of life. It might be suggested as a means of reaching a final decision that a commission might be appointed of, say, a dozen men—three from the American Society of Mechanical Engineers, three from the American Society of Civil Engineers, three from the American Association for the Advancement of Science and three from the New York Chamber of Commerce. Let these men be selected for their broad intelligence and freedom from partisan bias. Request this body to examine the subject in all its bearings, and from their point of view take ample time to reach their conclusion and report the results. A report from such a body would influence the nation and its representatives in the legislature and would probably settle the question for the next generation.

Gus C. Henning said, in part: In rising to discuss the paper before us I desire to preface my remarks with the statement that to me personally it makes no difference whether the metric system be adopted in this country as the legal standard or not. All I can say is that when I desire to do work for calculating and designing rapidly I frequently use the metric system, but when I put work into the shop my drawings are figured in inches and fractions thereof because that is the measure in common use in this country. The character of this paper which was written from the point of view of the spirit of commercialism and the weight to be attached to the statements made can be estimated and appreciated by analyzing the paragraph on page 2, which reads: "To cap the climax, the unfortunate resolution of this society last spring condemning the action of this committee in going to Washington was interpreted in the only way it could be, as a withdrawal by this society of its opposition to the measure, and for years we have been the only effective opposition." But what a huge joke the foregoing statement really is is shown by the following facts:

The Society's Committee.—No resolution was passed by this society at Boston condemning its committee. This society has not been the only effective opposition to the introduction of the metric system. The action of this society has not been misinterpreted by the withdrawal of its opposition to the measure. This society has never withdrawn its opposition to the measure. This society never has put itself on record in opposition to the metric system. This society never appointed a committee to oppose the metric system. This society's committee never went to Washington. This society never passed a resolution condemning the committee for going to Washington. This society has never taken a single effective step opposing the introduction of the metric system. This society's committee has never even taken any step to carry out the wise instructions given to it.

What has been done by this society and its committee is the following: The president of this society appointed a committee in May, 1896, "To prepare such material as may be necessary which may be used in opposition to legislation seeking to make the metric system and its use compulsory in the United States." This committee never prepared any such material up to the present day. Instead of this this committee went beyond its instructions and addressed a letter February 10, 1902, to the council, urging it to recommend to the members of the society that they bring pressure to bear on members of Congress to oppose a bill (H. R. 123) which does not provide for the compulsory use of the metric system in the United States. The society, in a resolution passed at Boston, 1902, merely condemned the action of two of its members in making an apparent attempt to represent it, and one of its committees, without authority to do so. This resolution was passed with almost a shout, and not one dissenting vote was heard against it. This society has always abstained from adopting and recommending standards of all kinds. This society has adopted the policy never to indorse, approve or recommend reports of committees of any kind. This society merely accepts reports and publishes them. The policy of this society has been never to enter the field of politics.

Taps, Dies and Drills.—On page 14 the author chooses to quote a statement made by myself four years ago which he tries to make out incorrect. When making this statement I did not say that taps, dies, drills, &c., made to the English or United States standard were not used on the Continent, as I took it for granted that it was a well-known fact that all these tools were bought in either the United States or England in large quantities. What I meant was that none of these are ever measured by workmen by the English standard. They are always used according to the marks thereon by which they are indicated on the drawings. Let me ask, does anybody in this country pull out his scale or micrometer to measure the dimensions of taps, dies and drills before he uses them? I must repeat that in all the shops I had occasion to visit on the Continent I never saw or knew to be on hand, except in the tool room, any English standards, and in the French shops I never saw anything but the metric standard.

Metric System in Spanish America.—In reference to the remarks on the "Persistence of old units in Spanish America," I shall quote the statements of an American engineer who has lived and worked in several South American countries for a period of ten years—namely, R. C. Alexander. In his communication Mr. Alexander said: "From early in 1886 for about four and one-half years I was employed as first assistant in the Argentine Meteorological and Magnetic Observatory, where, of course, we used only the metric system. In our work we employed many subcomputors and observers of moderate attainments and I found that they readily under-

stood and worked efficiently and rapidly with the metric system. In my opinion, the absolute accuracy required in our work could hardly have been obtained by any other system with the help we had. Apart from this governmental and purely scientific work, I had abundant opportunity and occasion to know of the civil engineering practice of the country, and in this as well I found that the metric system was used to the exclusion of all others not only in the field, but in the office and drafting room.

"With the metric system engineers of all nationalities met upon common ground and worked together in perfect harmony of understanding.

"In the sale of goods over the counter by retail the 'vara' out of respect for its age as a term may have been used extensively; but at the same time goods were valued by the meter, and the vara sold or bought meant only so much of the meter used as a standard just as an 'aroba' of corn or potatoes meant a certain number of kilos. So that no matter what term was used the metric system determined the quantity."

In Bolivia Mr. Alexander found practically the same state of affairs. Concerning other countries, he said: "In Peru and Chili I was closely connected with railway work, mining and chemical analysis for more than six years. I can testify to the fact that the metric system was used in assaying and other laboratory work, and in most departments of railway work."

Continuing his argument, Mr. Henning said: From the foregoing it will be seen that the statements contained in this paper are painted with all the colors of the rainbow, and that they do not issue from sources free from bias. They should be accepted with many grains of salt, and only after much reflection and complete verification.

Why German Shipyards Use English Measures.—The reason why these shipyards [German] use English measures is this: They use English shapes and ship fittings almost exclusively, and to a large extent are copying English designs. The reason why they use English shapes and ship fittings is that they can buy them cheaper and obtain them more promptly in England than in Germany. Under these circumstances it is plain that the English standards are more convenient for the two shipyards mentioned. As long as the metric system is not introduced in England just so long will the English standard be used to some extent in Germany and other countries. But this is no proof in any sense of the word that the metric system is not in general use in them, as the author tries to make it appear.

In our anthracite fields the Pennsylvania law makes it compulsory to weigh coal by the standard English weights, and failure to do so is punishable by a fine of $100 per day for each and every offense. Nevertheless for 27 years the coal barons have used the standard of a mine car heaped up with coal without weighing the coal and still continue to do so at the present time. The author forgot to mention the use of this standard of weight in a country which, as he must admit, uses the United States standards universally. He will, perhaps, also now understand why the old standards are still sometimes adhered to.

A. B. Johnson of the Baldwin Locomotive Works said in part: I have given much consideration to the subject. While I am of the opinion that the inconvenience and expense of substituting the decimal system for our present system of weights and measures have been overestimated, it appears to be a change which is unnecessary for us to make. The United States is a great manufacturing and exporting power. And when the present expansion of domestic trade subsides, so that we must again look abroad for our markets, we will enter into competition with the world with a force hitherto unknown. And expansion of the American export trade out of all proportion to any which it has hitherto had must then result. If we were to adopt the decimal system it would eventually force England to adopt it also, but if we continue the present system we shall compel other consuming countries to conform to that which we employ. In other words, the potentiality of this country as a producing, manufacturing and exporting country is so great that the world must accept that which we adopt. With England and the United States joined in using the present system all other countries will continue to adapt themselves to the present condition of things. I am therefore of the opinion that the proposed change would create an unnecessary inconvenience and disturbance until thoroughly known and established.

Fred. Eberhardt of Gould & Eberhardt, Newark, stated that not one piece in 10,000 called for by their European customers specified the metric system. They had practically no demand at all by foreign trade for the French method.

Report of Committee on the Metric System.

The following report on the metric system was made by the committee, composed of Coleman Sellers, chairman; Charles G. Porter, Prof. John E. Sweet, George W. Bond and Coleman Sellers, Jr.:

The common sense of mankind has taught them that in all systems of measurement, convenience of forming mental conceptions, convenience of expression, whether verbal or written, convenience of computation and convenience of memory, all require that intervals, distances and dimensions shall be expressed in terms of the largest suitable unit, supplemented by smaller units when necessary.

The circle is divided into degrees, minutes and seconds; time is expressed in years, months, days, hours, minutes and seconds. By English speaking peoples geographical measurement is expressed in miles and binary divisions of the mile. Land measurement is expressed in rods, yards, feet and inches. In cloth measurement and in civil engineering works our unit is the yard with its binary divisions. In monetary divisions the English employ three units: Pounds, shillings and pence. We have two units: The dollar and cent.

In all these measurements the principle observed is to employ the largest unit until it becomes necessary to resort to the smaller ones. In conformity with this principle we, in common with all English speaking people, employ in mechanical measurements two units, the foot and inch, and the division of the latter by continual bisection. We also employ decimal divisions of the inch when necessary, but not otherwise, finding the binary divisions more convenient for general use. It will be observed that in all systems, except the metric, these units and all their binary divisions have distinctive names, and so are presented to the mind as concrete realities.

In defiance of the principles above stated the metric system requires the designer and constructor of machinery to employ a single unit, and that the smallest possible, the millimeter, nearly 0.04 inch, and to express all dimensions in terms of this unit and to employ the decimal system only.

A comparison of the English and French systems of linear measurement shows as follows: The French system consists of a single arbitrary unit, the meter, and decimal divisions and multiples of this unit. To this single unit and this single system of division the metric system is limited. The English system consists of five units in common use, which are adapted to all dimensions and distances, from the smallest to the largest; and the two systems of division, the decimal system and the binary system. The decimal system meets all requirements that any decimal system could do.

A binary system is found so much the more convenient that it is employed exclusively to express divisions of miles, rods and yards. The foot we divide into inches. We then return to binary divisions of the inch, and employ this system for all ordinary uses, resorting, as already observed, to decimal divisions of the inch only when we are obliged to. The two systems work in perfect harmony. The reason for this universal preference of the binary system lies in this valuable feature. Its smaller divisions are aliquot parts of all larger divisions of the unit, and conversely the latter are all multiples of the former. It is thus seen to be the natural system of division—continual bisection.

In addition to this and founded upon the interest-

ing relation between the two engineering units, the foot and the inch, we have a remarkable system of scales, the valuable general feature of which is a mutual interrelation similar to that between binary divisions of any unit, as above noted.

These great advantages, palpable to every one, in the judgment of your committee, render it certain that before the close of this century the English system of measurement will come into universal use, and when the metric system, so far as measurements are concerned, will, as its supposed scientific foundation has already, have disappeared.

The committee presented the following resolutions, which were accepted:

Resolved, That the mechanical engineers of this country are the only parties competent to decide intelligently upon a system of measurements most suitable to their own use.

Resolved, As for the bill now before Congress, providing that the metric system shall be the legal system of weights and measures in the United States, and making its use obligatory in the Government departments, that, so far as it affects mechanical measurements, conceived in ignorance, it is simply absurd.

Among those in attendance were the following:

List of Members.

George I. Alden, Norton Emery Wheel Company, Worcester, Mass.
Louis Albion Alexander, M. M. Brass Mill, A. B. & C. Company, Ansonia, Conn.
Thomas R. Almond, 83 Washington street, Brooklyn, N. Y.
Darwin Almy, president Almy Water Tube Boiler Company, Providence, R. I.
Edward R. Archer, chief engineer Tredegar Company, Richmond, Va.
E. J. Armstrong, superintendent Ball Engine Company, Erie, Pa.
Daniel Ashworth, sales manager for C. W. Hunt Company, Pittsburgh, Pa.
Chas. Whiting Baker, editor *Engineering News*, New York.
Stephen W. Baldwin, New York agent Penn. & Maryland Steel companies.
J. Sellers Bancroft, manager Wm. Sellers & Co., Incorporated, Philadelphia.
Chas. W. Barnaby, mechanical engineer American Engineering Works, Chicago.
John Martin Barnay, Bullock Elect. Mfg. Company, Cincinnati.
Geo. H. Barrus, expt. and cons. steam engineer, Boston.
Edward P. Bates, manufacturer heating apparatus, Syracuse, N. Y.
William P. Bettendorf, president Bettendorf Axle Company, Davenport, Iowa.
Charles E. Billings, president Billings & Spencer Company, Hartford, Conn.
Henry B. Binsse, president Binsse Machine Company, Newark, N. J.
John P. Bland, M. E. Wm. Sellers & Co., Philadelphia.
Wm. A. Bole, superintendent Westinghouse Machine Company, Pittsburgh.
A. P. Boller, Jr., engineering department Henry R. Worthington Hydraulic Works, Brooklyn.
Geo. M. Bond, manager standards and gauge department, Pratt & Whitney Company, Hartford, Conn.
Edwin S. Boyer, manager American Engine Company, New York.
Francis Howard Boyer, refrigerating and ice machines, Somerville, Mass.
W. H. Bristol, professor of mathematics, Stevens Institute of Technology, Hoboken, N. J.
Robert S. Brown, New Britain Machine Company, New Britain, Conn.
E. P. Bullard, president the Bullard Machine Tool Company, Bridgeport, Conn.
Theo. F. Burgdorff, lieutenant-commander U. S. N., Navy Yard, New York.
John Allen Capp, chief of test laboratory, General Electric Company, Schenectady, N. Y.
James Christie, chief engineer Pencoyd Iron Works, Pencoyd, Pa.
W. Wallace Christie, cons. engineer, Paterson, N. J.
M. E. Cooley, professor mechanical engineering, University of Michigan, Ann Arbor, Mich.
Charles H. Corbett, vice-president Continental Iron Works, Brooklyn.
W. P. Dallett, engineer and contractor for Deming Company and Buffalo Steam Pump Company, Philadelphia.
Jacob S. Detrick, president Detrick & Harvey Machine Company, Baltimore, Md.
Geo. Dinkel, Jr., chief engineer American Sugar Refining Company, Jersey City, N. J.
Jas. M. Dodge, president Link-Belt Engineering Company and president Dodge Coal Storage Company, Philadelphia.
Frederick L. Eberhardt, Gould & Eberhardt, Newark, N. J.
Victor E. Edwards, Morgan Construction Company, Worcester, Mass.
Henry O. Evans, mechanical engineer Thos. Devlin & Co., Philadelphia.
Da Faur Faber, cons. engineer, 132 Nassau street, New York
Edwin R. Fellows, manager the Fellows Gear Shaper Company, Springfield, Ill.
Frederick C. Fladd, E. W. Bliss Company, Brooklyn, N. Y.
John Fritz, cons. engineer, Bethlehem, Pa.
Henry L. Gantt, American Locomotive Company, Schenectady, N. Y.
Frederick August Geier, the Cincinnati Milling Machine Company, Cincinnati.
Alex. Gordon, president Niles Tool Works Company, Hamilton, Ohio.
Geo. Edward Greenleaf, the Pond Machine Tool Company, Plainfield, N. J.
Chas. Lewis Griffin, associate professor machine design, Pennsylvania State College, State College, Pa.
Paul H. Grimm, chief engineer National Starch Company, Glen Cove, N. Y.
F. A. Halsey, associate editor *American Machinist*, New York.
F. W. Harding, New York Belting & Packing Company, Limited, Passaic, N. J.
James Hartness, president Jones & Lamson Machinery Company, Springfield, Vt.
Alfred Geo. Heggem, superintendent Russell Engine Company, Massillon, Ohio.
Gustavus C. Henning, cons. engineer, New York.
Edward M. Hewlett, manager of switchboard department, General Electric Company, Schenectady, N. Y.
Warren E. Hill, Continental Iron Works, Brooklyn.
John Hulett, Exeter Machine Works, Pittstown, Pa.
Geo. S. Humphrey, controller and purchasing agent, C. W. Hunt Company, New York.
Charles Wallace Hunt, 45 Broadway, New York.
Frederic R. Hutton, secretary of the society, New York.
Ward S. Jacobs, the Johns-Pratt Company, Hartford, Conn.
D. S. Jacobus, professor experimental mechanics and engineering physics, Stevens Institute, Hoboken, N. J.
Wallace Clyde Johnson, cons. engineer the Niagara Falls Hydraulic Power & Mfg. Company, Niagara Falls, N. Y.
John C. Kafer, passed assistant engineer, U. S. N., New York.
Wm. Kent, associate editor *Engineering News*, New York.
August H. Kruesi, designing engineer, General Electric Company, Schenectady, N. Y.
Wilfred Lewis, president Tabor Mfg. Company, Philadelphia.
John Wood Logan, manager Logan Mfg. Company, Phœnixville, Pa.
Fred. R. Low, editor *Power*, New York.
Chas. Fred'k McGill, mechanical superintendent, Canadian General Electric Company, Ontario, Canada.
E. D. Meyer, president Heine Steam Boiler Company, New York.
George Mesta, president Mesta Machine Company, Pittsburgh.
Fred. J. Miller, editor *American Machinist*, New York.
Spencer Miller, mechanical engineer, New York.
Richard G. G. Moldenke, cons. metallurgist, Watchung, N. J.
M. F. Moore, president Marine Engine & Machine Company of Harrison, N. J.
Charles H. Morgan, president Morgan Construction Company and Morgan Spring Company, Worcester, Mass.
Geo. S. Morison, civil engineer, New York.
Carleton W. Nason, president Nason Mfg. Company, New York.
Chas. L. Newcomb, general manager Deane Steam Pump Company, Holyoke, Mass.
Henry McCoy Norris, works manager Bickford Drill & Tool Company, Cincinnati.
Edward H. Parks, Brown & Sharpe Mfg. Company, Providence, R. I.
Franklin Phillips, Hewes & Phillips Iron Works, Newark, N. J.
Chas. T. Porter, Montclair, N. J.
Chas. Richardson Pratt, Marine Engine & Machine Company, Montclair, N. J.
H. G. Reist, mechanical and electrical engineer, General Electric Company, Schenectady, N. Y.
Richard H. Rice, Providence Engineering Work, Providence, R. I.
Francis H. Richards, mechanical engineer and expert in patent causes, New York.
George Richmond, cons. engineer, De La Vergne R. M. Company, New York.
Winfield S. Rogers, general manager the Steamobile Company of America and of Roller Bearing Equipment Company, Keene, N. H.
William R. Roney, mechanical engineer, Westinghouse, Church, Kerr & Co., New York.
C. M. Russell, vice-president Russell & Co., Massillon, Ohio.
Henry D. Sharpe, Brown & Sharpe Mfg. Company, Providence, R. I.
Jesse M. Smith, mechanical and electrical engineer, New York.
H. W. Spangler, professor dynamic engineering, University of Pennsylvania, Philadelphia.
Alfred H. Stevens, Whiting Foundry Equipment Company, Harvey, Ill.
Francis Hill Stillman, the Watson-Stillman Company, Brooklyn.
Henry Harrison Suplee, editor *Engineering Magazine*, New York.
John E. Sweet, president Straight Line Engine Company, Syracuse, N. Y.
Wm. M. Taylor, president Chandler & Taylor Company, Indianapolis, Ind.
Robt. H. Thorpe, president Thorpe, Platt & Co., New York.
Herbert Gray Torrey, U. S. assayer, U. S. Assay Office, New York.
Henry R. Towne, president Yale & Towne Mfg. Company, Stamford, Conn.
John Turner, superintendent construction, Saunderson & Porter, New York.

Chas. C. Tyler, superintendent, Westinghouse Elect. & Mfg. Company, Pittsburgh, Pa.
Anthony Victorin, mechanical and cons. engineer, Ordnance Office, War Department, Washington.
Arthur C. Walworth, president Walworth Construction & Supply Company, Boston.
Worcester R. Warner, the Warner & Swasey Company, Cleveland, Ohio.
Samuel S. Webber, manager Trenton Iron Company, Trenton, N. J.
Samuel T. Wellman, Cleveland, Ohio.
F. Meriam Wheeler, manager marine department, George F. Blake Mfg. Company, New York.
Wm. H. Wiley, 43-5 East Thirteenth street, New York.
John T. Wilkin, the Connersville Blower Company, Connersville, Ind.
Franklin Williams, assistant general manager Eastwood Wire Mfg. Company, Belleville, N. J.
Erwin E. Wood, general superintendent Jones & Lamson Machine Company, Springfield, Vt.
Walter Wood, manager for R. D. Wood & Co., Philadelphia.
James Knox Wright, builder of Wright engines, New York.

Canadian Notes.

Molten Iron Entitled to Bounty.

TORONTO, CANADA, December 6, 1902.—On Friday, in the petition of right of the Dominion Iron & Steel Company against the King, Justice Burbidge of the Exchequer Court entered judgment in favor of the company. It grants the whole sum claimed, $196,967, leave being given to either party to move to have an account taken, the amount so ascertained to be substituted for the above mentioned sum. The company gets costs. The case arises upon the construction of the Dominion act authorizing the Governor in Council to pay bounties "on steel ingots, puddled iron bars and pig iron made in Canada." The company, like most manufacturers of pig iron and steel to-day, use the product of their blast furnaces while yet in a liquid or molten state for the manufacture of steel, the hot metal being taken direct from the blast furnace to the steel mill. A question having been raised by the Government as to whether the company were entitled to the said bounties as for the manufacture of steel from pig iron, the bounties were withheld, pending the direction of the Exchequer Court. Justice Burbridge holds in effect that the term "pig iron" includes that in a liquid or molten state as well as in its solid form.

A Duty on Steel Rails.

Mr. Clergue's advocacy of a duty on steel rails, which are now on the free list, has given rise to considerable discussion in the press. Many newspapers that support the Government are using their influence to have protective duties increased at a number of points, notably in respect to steel rails. The situation in respect to steel rails is rather singular. At the moment the steel interests in Nova Scotia do not appear to be interesting themselves very greatly in the efforts of the steel manufacturers at Sault Ste. Marie to have a duty placed on rails. They have a profitable export market for their billets and, for the time being, are satisfied. Even if the steel rail industry enjoyed protection they might still find it to their advantage just now rather to export the pig iron or the billets than to manufacture rails. Once, however, the domestic supply of pig iron and crude steel in the United States becomes adequate, the problem of how to dispose of their product may move the Nova Scotia interests to join in the demand for a duty on rails. The Dominion Iron & Steel Company have in construction mills for rolling steel into rails and ship plates. No doubt these works could have been hurried to completion, had there seemed any pressing need for their operation. The logic of Mr. Clergue's contention that steel rails ought to be protected is apparently not understood by the opponents of a duty on rails. They say that the steel manufacturer who uses domestic ore, as Mr. Clergue does, is already assisted too liberally. On pig iron made from domestic ore there is a Dominion Government bounty at present of $2.70 per ton, and an Ontario Government bounty of $1 a ton. On Canadian steel ingots, 50 per cent. of which is made from Canadian pig iron, there is a Dominion bounty of $2.70 per ton. So the bounties which have been paid to the manufacturer by the time the steel billet is reached amount to $6.40 a ton. Besides this there is a customs duty of $2.50 a ton on pig iron and one of $2 a ton on steel billets. So the total amount of help to the steel maker who produces all the way from Ontario ore to the billet comes to $10.90 a ton. "If," say the opponents of a steel rail duty, "the home manufacturer needs any more help to produce rails, the industry is too costly." They do not advocate a reduction of the present public aid, but they deny the need of any more to secure the making of rails. As a matter of fact a protective duty on rails is almost a necessary consequence of the liberal assistance that is now given to the production of raw steel. If there was little or no fostering of the raw material the plea for a duty on rails would have much less force than it has now. For the country is following a policy that ends, not in a finished product at home, but in a raw material. As there is no Government inducement here for the converting of that raw material into a finished product within Canada the manufacturers of it will naturally look elsewhere for the disposal of it. If there is a market for steel billets in the United States it may pay them better to sell billets there than to make steel rails in a market where steel rails are unprotected. As a consequence of this situation, at a time when Canada is requiring large quantities of steel rails and producing large quantities of steel billets, she is exporting the latter and importing the former. Ship loads of steel rails are coming in from Germany, while ship loads of billets are going out to the United States. A protective duty on rails would save both benefits for Canada.

In the railways the country has already been quite generous. Every foot of the 18,137 miles of railway in the Dominion has been heavily subsidized in many cases by the Province as well as by the Dominion, and in some cases by municipalities also. Railway development, being no longer in the infant stage, can very well bear a duty on rails.

Iron Deposit Near Sudbury.

The announcement that an important discovery of iron had been made in the Wahnapitae district, north of Sudbury, created a great amount of interest in Toronto and other centers of Ontario. Some allowance is freely made for enthusiasm in the reports that come from the range, but it is believed that after all deductions have been made for that element the deposit will be found to be a valuable one. In due time a report upon its probable extent and quality will be forthcoming from the Bureau of Mines, whose staff has collected a large volume of information about that region. C. A. C. J.

The Youngstown Iron Sheet & Tube Company.

During this month the Youngstown Iron Sheet & Tube Company, Youngstown, Ohio, expect to start up their skelp mills, and the company will then have in operation 14 double puddling furnaces, one sheet bar mill, six hot sheet mills and three sets of cold rolls with a capacity of 1500 tons of sheets per month, corrugating department, two galvanizing pots, two bell weld and one lap weld furnace, producing 5000 tons of new process ⅜ to 8 inch pipe per month. The pipe galvanizing plant will be ready in January. The skelp department will have a daily capacity of 200 tons. The company manufacture wrought iron and steel sheets and pipe, black and galvanized, making a specialty of double refined puddled iron sheets and pipe. On June 28 last the company took over the Alice Furnace, in Sharpsville, Pa., of Pickands, Mather & Co., Cleveland, which is now making about 250 tons of basic and mill iron for consumption at the Youngstown Works. Excavations are being made for six 50-ton open hearth furnaces, capacity 600 tons. In the supply of raw material the company have an interest in 6000 acres of coal land near Masontown, Preston County, W. Va., underlaid with a 14-foot vein. Joint interests will soon organize for the erection of 500 ovens. In the matter of ore supply, the company jointly hold four mining properties of 260 acres in the Mesaba range under the Crete Mining Company, three of which are being developed, the Troy, Albany and

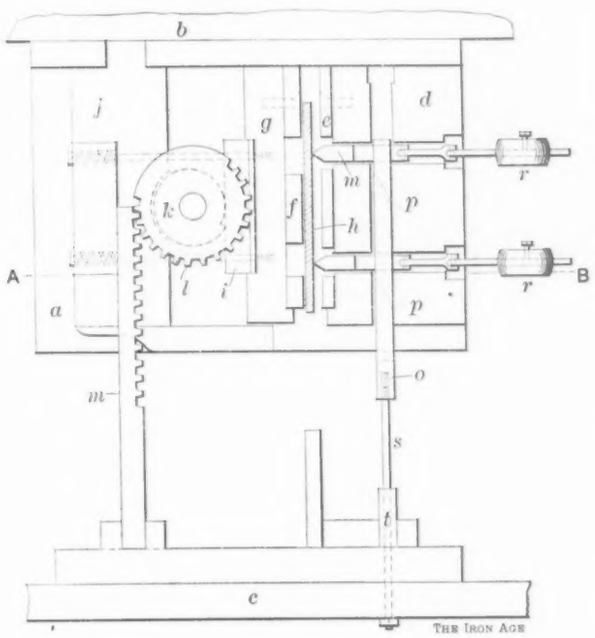
Utica. The first consignment of two cargoes was received last month. The Youngstown Iron Sheet & Tube Company were incorporated in November, 1900, with a capital stock of $600,000, which was increased to $1,000,000, then to $2,000,000, and later $4,000,000. Work was started on the building of the plant in the spring following, and on February 6, 1902, they began to make iron sheets.

Metal Crimping Machine.

Letters patent have been assigned to the Pressed Steel Car Company of Pittsburgh for a machine for crimping metal plates. In present steel car constructions the truck bolsters are provided with chafing plates on their sides, which form guides co-operating with the column posts of the truck frames in order to control the movements of the bolster between the posts. Heretofore these plates have been made by dies pressing a blank to shape. The machine here described is designed to do this work in a single continuous crimping operation. The machine comprises a blank holder or clamp, and rams equal in number of the crimps to be made. Provision is also made for contracting the clamp at right angles to the bends and so finish the article. Attached to the base piece *d* is the clamp *e*, the opposite member of which is secured to the block *g*. These portions of the clamp are fixed, but the other parts are arranged loosely in ways. The blank *h* is placed edgewise between the clamps. The block *g* is provided with a cam plate, *i*, and both are connected by rods with springs arranged in sockets in a stationary block, *j*. Next to the plate is a cam, *k*, mounted upon a vertical shaft, which also carries the segment gear *l*, which is operated by the rack *m*. By this means the blank is moved toward the clamp members *e*. The clamp members are placed apart a sufficient distance to permit an initial bending of the blank and the subsequent crimping of the blank at these bent lines.

The bending is effected by the rams *n*. An abutment block, *o*, is mounted in a guide in the base, at right angles to the rams, and is loosely connected by the rod *s* with the movable head *e*. The block *o* is made with openings to admit the rams. The rams are connected by links to the counterweighted levers *r*, these weights being sufficient to withdraw the rams when released. The movable head *e* has a plunger, *s*, the action of which is to upset or crimp the blank.

In Fig. 1 the parts are all in position to begin the crimping. The blank is then forced against the edges of the rams, as indicated in Fig. 3. During this operation the head *e* has carried its plunger, *t*, into contact with the abutment block and the rams are free to be retracted by the counterweights. The plunger *s* continues to move and carries the movable parts of the clamp and the blank forward and thereby effects the crimping as shown in Fig. 4.



Plan.

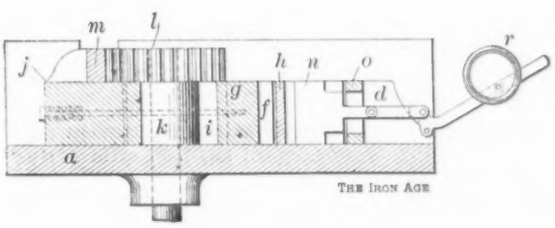


Fig. 2.—Section on Line A B of Fig. 1.

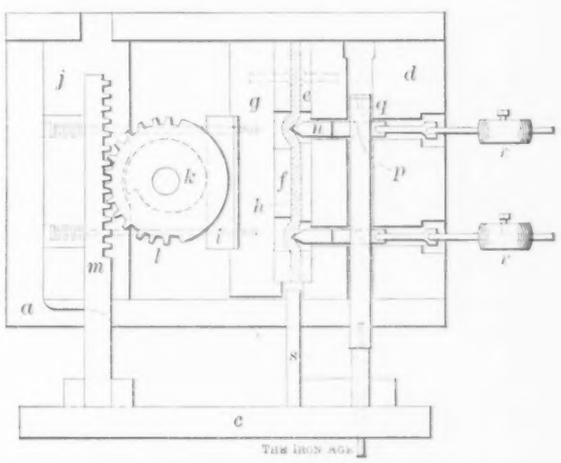


Fig. 3.—Plan View, Showing Blank Bent.

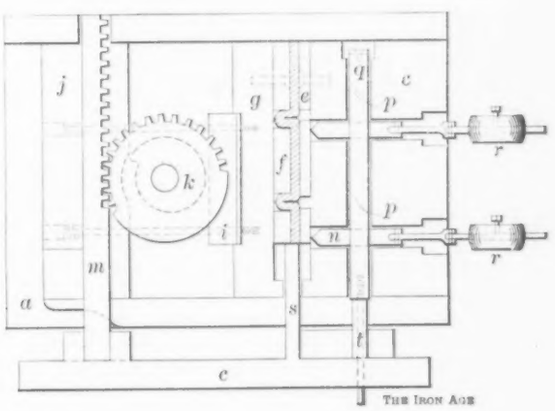


Fig. 4.—Plan Showing Final Crimping Operation.

METAL CRIMPING MACHINE.

The Musconetcong Iron Works, at Stanhope, N. J., changed owners December 4. A new Board of Directors was elected and organized by electing E. H. Bennett president and T. T. Grover secretary and treasurer. Mr. Bennett is second vice-president of the Singer Mfg. Company of New York, and it is likely that this plant will be allied with that company. A rolling mill may be built in connection with the furnace.

Philip W. Moen, second vice-president of the American Steel & Wire Company, has tendered his resignation because of private interests.

The Allis-Chalmers Company.

Statement to the New York Stock Exchange.

Following is an abstract of the statement made to the New York Stock Exchange, accompanying the application of the Allis-Chalmers Company for listing the stock:

Allis-Chalmers Company hereby apply to have placed on the regular list of the New York Stock Exchange their present issued capital stock, as follows: $16,250,000 cumulative preferred 7 per cent. stock, being 162,500 shares at $100 each, and $20,000,000 common stock, being 200,000 shares at $100 each, all fully paid and nonassessable. The company were incorporated under the laws of the State of New Jersey, on May 7, 1901. They are an original organization. The company own all the property, assets, good will, rights, privileges, and things of value of every kind and nature, tangible and intangible, as they existed on April 1, 1901, and then belonging to the following companies (manufacturers of machinery), viz.:

The Edward P. Allis Company of Milwaukee, Wis.
Fraser & Chalmers, Incorporated, Chicago, Ill.
Gates Iron Works, Chicago, Ill.
Dickson Mfg. Company, Scranton, Pa. (exclusive of locomotive works).

The real estate, plant and equipment formerly of the Edward P. Allis Company and now belonging to this company are located at Milwaukee, Wis., and West Allis, Wis. The Milwaukee plant consists of 20 acres of land, and buildings containing necessary machinery, tools and appliances for the manufacture of heavy machinery and steam engines, also saw mill and flour mill machinery.

This company are now building and have partially completed a new plant at West Allis (suburb of Milwaukee), equipped with improved tools and machinery. For this plant and equipment $2,586,000 was set aside from the cash capital of $10,000,000. Of this appropriation there has been expended to date $1,771,628.93. In addition there are contracts let for $290,767.38, making a total expenditure and work contracted for of $2,062,396.31. The works occupy a rectangular piece of land covering 113 acres.

The real estate, plant and equipment of the Fraser & Chalmers Works are located at Chicago, Ill., and consist of 11½ acres of land, and comprise buildings equipped with necessary machinery, tools and appliances for the manufacture of mining machinery, smelting and concentrating machinery, engines, pumps and stamp mills.

The real estate, plant and equipment of the Gates Works are located at Chicago, Ill., and consist of 4½ acres of land, and comprise buildings equipped with necessary machinery, tools and appliances for the manufacture of rock and ore breakers and mining, crushing and cement machinery.

The real estate, plant and equipment of the Dickson Works, located at Scranton, Pa., and Wilkes-Barre, Pa., consist of 9 acres of land, and comprise buildings equipped with the necessary machinery, tools and appliances for the manufacture of sugar machinery, engines and coal mining machinery.

Special provisions of the certificate of incorporation are as follows:

The total authorized capital stock of the corporation is $50,000,000, divided into 500,000 shares of the par value of $100 each. Of such authorized capital stock, 250,000 shares, amounting to $25,000,000, shall be preferred stock, and 250,000 shares, amounting to $25,000,000, shall be common stock. The holders of the preferred stock shall be entitled to receive, when and as declared, from the surplus or net profits of the corporation, yearly dividends at the rate of 7 per cent. per annum, payable quarterly on dates to be fixed by the by-laws. The dividends on preferred stock, to the extent of 7 per cent. per annum, and no more, shall be cumulative, and shall be payable before any dividend on common stock shall be paid or set apart, so that if in any year dividends amounting to 7 per cent. shall not have been paid on said preferred stock the deficiency shall be payable before any dividends shall be paid upon or set apart for the common stock.

Whenever all cumulative dividends on the preferred stock for all previous years shall have been declared and shall have become payable, and the accrued quarterly installments for the current year shall have been declared, and the company shall have paid such cumulative dividends for previous years and such accrued quarterly installments, or shall have set aside from their surplus or net profits a sum sufficient for the payment thereof, the Board of Directors may declare dividends on the common stock, payable then or thereafter, out of the remaining surplus or net profits.

After dividends of 7 per cent. per annum shall have been paid on the common stock, as above provided, then out of any remaining surplus or net profits the Board of Directors may declare and pay to the holders of the preferred stock an additional dividend equal to, but not more than, 1 per cent. per annum, which additional 1 per cent. shall not be cumulative. All further or other surplus or net profits (after the payment of 8 per cent. on the preferred stock and 7 per cent. on the common stock) shall be payable and applicable as dividends on the common stock.

In event of any liquidation or dissolution or winding up (whether voluntary or involuntary) of the corporation, the holders of the preferred stock shall be entitled to be paid in full, both the par amount of their shares and the unpaid cumulative dividends accrued thereon, before any amount shall be paid to the holders of the common stock; and after the payment to the holders of the preferred stock of its par value, and the unpaid accrued cumulative dividends thereon, the remaining assets and funds shall be divided and paid to the holders of the common stock according to their respective shares.

The holders of the preferred stock shall have the right, upon the first day of May in each year, until and including May 1, 1921, to surrender such preferred stock and accept and receive in lieu and in conversion thereof common stock, such exchange or conversion to be share for share, and to be exclusive of any declared dividends.

The company submit herewith the first annual report of the company, which shows the business of the company during their first fiscal year, and contains a correct balance sheet of the company as of May 1, 1902, and shows their net earnings for the fiscal year ending April 30, 1902, and also the balance sheets and statements of earnings as of September 30, 1902, which balance sheets and statements of earnings are as follows:

Assets.

Real estate, buildings, plant, machinery, goodwill, &c.		$27,352,081.92
Bills and accounts receivable	$2,778,720.88	
Stocks of merchandise, materials and work in progress (at cost)	3,333,664.99	
Cash	4,514,167.05	
		10,626,552.92
Total		$37,978,634.84

Liabilities.

Capital stock: Preferred	$16,250,000.00	
Common	20,000,000.00	
		$36,250,000.00
Accounts payable	$1,139,500.33	
Dividend No. 4*	284,375.00	
		1,423,875.33
Surplus: Profits for period	$1,442,259.51	
Less: Dividends on preferred stock	1,137,500.00	
		304,759.51
Total		$37,978,634.84

* Paid May 1, 1902.

Of the amount shown above as due for current purchases, $670,120.92, practically all has been paid during the current month.

The current assets amount to $10,625,552.92, and the current liabilities to $1,423,875.33, leaving net current assets of $9,202,677.59.

Statement of profits for the period from the commencement of the company's operations to April 30, 1902:

Net profits, after deducting all expenses of manufacture and selling, and after making full provision for depreciation of buildings, plant and machinery, and for possible bad debts		$1,442,259.51
Deduct: Dividends declared on preferred stock—		
No. 1, 1¾ per cent., payable July 25, 1901	$284,375	
No. 2, 1¾ per cent., payable November 1, 1901	284,375	
No. 3, 1¾ per cent., payable February 1, 1902	284,375	
No. 4, 1¾ per cent., payable May 1, 1902	284,375	
		1,137,500.00
Balance: Surplus carried to balance sheet		$304,759.51

Balance sheet, September 30, 1902:

Assets.

Real estate, buildings, plant, machinery, goodwill, &c.		$28,331,324.39
Bills and accounts receivable	$2,319,058.60	
Stocks of merchandise, materials and work in progress (at cost)	4,082,090.85	
Cash	3,298,538.97	
		9,699,688.42
Total		$38,031,012.81

Liabilities.

Capital stock: Preferred	$16,250,000.00	
Common	20,000,000.00	$36,250,000.00
Accounts payable	$1,064,845.24	
Dividends accrued	189,583.34	1,254,428.58
Surplus, April 30, 1902	$304,759.51	
Profits, April 30 to October 1, 1902	$695,783.06	
Less dividend on preferred stock declared and accrued	473,958.34	
Surplus for five months over dividend on preferred stock	221,824.72	
Total surplus		526,584.23
Total		$38,031,012.81

Central Pennsylvania Notes.

HARRISBURG, PA., December 6, 1902.—There was a decided improvement in the industrial situation in Central Pennsylvania this week, both as to car and fuel supplies, and as a result all of the mills report good productions, and some have had record breaking outputs. At the works of the Pennsylvania Steel Company, in Steelton, No. 4 blast furnace was blown in Tuesday after an idleness of two months, during which repairs were made to the stack, and a slight fire at No. 2 furnace did not decrease the output. The rail mill broke its former record for large production, turning out in one 24-hour turn over 1000 tons, and in 12 hours 534 tons. The new bridge and switch departments are in operation, and both new and old mills are working day and night. During the latter part of the week shipments were slightly retarded and coal and coke ceased to be received in quantity. Although the situation is much better than it was a week ago continuous operation is by no means assured.

So busy are the Harrisburg Boiler & Mfg. Company that new orders are being refused. The company's directors have under consideration a plan to enlarge the plant here, but will make public no details for the present.

The Harrisburg Foundry & Machine Works this week received orders for a 200 horse-power engine for the Grand Junction Smelting Company of Boston, a 75 horse-power engine for the Scranton Electrical Construction Company and a smaller engine for the Nicholas Chemical Company of New York.

The Central Iron & Steel Company of this city this evening completed a rush order for 3000 steel plates for the Standard Steel Car Company of Butler.

It is rumored that the work on the pipe mill now under course of construction at the plant of the Susquehanna Iron & Steel Company, at Columbia, is to be stopped and the mill abandoned. It is intended for the manufacture of all sizes of pipe up to 6 inches in diameter. The furnaces have been almost completed, and the power house is finished except the interior, and the roof was last week placed on the threading mill. The report that work is to be abandoned is persistent here, and comes from apparently authoritative sources, but Columbia advices are that the mill will be completed and operated as planned.

The Board of Directors of the Frick Mfg. Company of Waynesboro, Cumberland County, on Tuesday declared a dividend of 6 per cent. out of the earnings of the past year, payable February 1, 1903. A statement of business for the year will be made at the annual meeting of the stockholders next Tuesday.

The Norway Iron & Steel Works resumed work this week after a shutdown caused by inability to secure fuel.

The sum of $9000 was paid out on Saturday of last week as the first week's wages of the Eastern Steel Company, successors of the Pottsville Iron & Steel Company, at Pottsville. Work is being rushed on the furnaces for the new 23-inch mill, and it is expected that the addition to the plant will be ready for operation by next spring.

The suit brought by the West End Rolling Mill Company & Chain Works, Lebanon, Pa., against the Janson Iron Company, Columbia, Pa., for default on a contract in which the latter agreed to supply the former company with 300 tons of bar iron, was tried in the Lancaster County Court, November 26 to 29. The jury rendered a verdict for $1448, in favor of the West End Company, the Janson Company to pay the costs of the trial. This suit was brought to recover the difference between the price of iron in the original contract and the price paid in open market for the unfilled part of the contract by the West End Company after the Janson Company discontinued shipments.

The Turret Lathe Mfg. Company are building a plant at Warren. The building is now being placed under roof after many delays caused by inability to secure shipments of material, and will be completed in about three months. A part of the machinery to be used in the mill is on the ground.

The big furnace of the South Chester Tube Works was started Thursday evening after a suspension of six weeks. The starting of the furnace means the operation of several departments of the plant that have been closed for several weeks.

The annual meeting of the stockholders of the Landis Tool Company of Waynesboro, was held Thursday afternoon, at which time the directors were authorized to increase the capital stock of the corporation from $150,000 to $250,000. The growth of the business during the last year has been such that the company have not been able to handle the volume of orders constantly pouring in. To meet this increase the new stock issue has been authorized for the enlargement of the plant. These directors were elected: A. H. Strickler, Paul Hoover, W. H. Snyder, W. T. Omwake, F. Fortham, S. B. Rinehart, T. B. Smith, Ezra Frick and John Shank. The board will organize January 1.

The employees of the Crane Iron Works and the Empire Iron & Steel Company of Allentown have been notified of an advance in wages of 10 per cent., to take effect January 1. The order affects 450 men.

The Duncannon Iron Company resumed operations this week after a short shutdown of the entire plant, due to fuel scarcity and car famine.

The annual meeting of the stockholders of the Emmert Mfg. Company of Waynesboro was held Thursday afternoon. The only change on the Board of Directors was the election of H. Clarence Gordon to succeed A. H. Hutchinson.

The report comes from Lebanon that the Pennypacker Steel Company will erect a steel plant at their Lebanon furnaces, and that the plans are already being drawn by a Philadelphia architect. The company have a large tract of land near the furnaces, and it is on this tract that report says an open hearth steel plant and plate mill are to be erected. Coke ovens are also being considered, everything to be ready for operation by 1904.

These companies were incorporated at the State Department in this city during the past month:

The Pittsburgh Zinc Company, Pittsburgh; capital, $2000 Directors: W. McLain, C. E. Middleton, R. V. Falconer, of Pittsburgh.

The Gorman Furnace & Mfg. Company, Pittsburgh; capital, $10,000. Directors: Charles Schwan, Nicholas Hartman, Joseph Krener, George J. Schmidt, Pittsburgh; Wm. Gorman, Blairsville.

York Corrugating Company of York; capital, $10,000. Directors: P. C. Wiest, E. A. Rice, Wm. P. Wiest, of York.

The E. C. Fell Mfg. Company of Philadelphia; capital, $10,000. Directors: Philip W. Wirth, Adolphus Wirth, Minneapolis; E. Chester Fell, Rachel S. Fell, Philadelphia.

Schatt & Morgan Cutlery Company of Titusville; capital, $35,000. Directors: John W. Schatt, Charles B. Morgan, Jesse V. Crouch, Gowanda, N. Y.; John Fertig, Edward O. Emerson, Titusville.

Kiser Mill & Elevator Company of Scranton; capital, $50,000. Directors: W. W. Kiser, F. A. Pech, Eber W. Worthington, A. F. Kiser, Dalbys L. Fickes, Scranton.

Edward Darby & Sons of Philadelphia, for the manufacture of wire cloth, wire goods and wire work of every description; capital, $150,000. Directors: Edward Darby, Edward J. Darby, Henry F. Darby, Philadelphia, and George B. Darby of Baltimore.

Hermance Machine Company, Williamsport; capital, $30,000. Directors: A. D. Hermance, C. D. Marsh, John R. T. Ryan, J. T. Fredericks, Williamsport.

The Pennsylvania Steel Company are rushing work on

their new coke ovens at Steelton and when these are finished the company will be in a measure independent, as the recent purchase of the great ore mines at Cornwall assures a supply of nearby ore for many years. The Pennsylvania Steel Company have been saved some embarrassment during the coal famine by a close alliance with the Cambria Steel Company, these two companies supplementing each other in many ways. Effingham B. Morris has done much to bring this about, and he is quoted as saying that the two companies will close the year with $35,000,000 worth of unfilled orders on their books.

At the bridge and construction department of the Steelton mills drawings have been received for a portion of the 9000-ton order of steel bridge work ordered by the Pennsylvania Railroad for 1903 delivery. Numerous improvements are being made at the bridge works, which when completed will be among the best equipped in the world. The plant has a special system of cranes for handling heavy material which is unique, no other company having anything approaching the extent of their facilities.

The Central Iron & Steel Company of this city are working night and day on a big order of plate for the Pennsylvania Railroad shops at Altoona. The building of new locomotive shops by the Pennsylvania Railroad Company at Altoona will increase the business of the Central, as all the plate used by the railroad company at that place is manufactured here.

The Harrisburg Mfg. & Boiler Company are considering plans for improvements.

It is probable that the Norway Iron & Steel Company of York will enter the malleable iron consolidation now being formed. The plant is one of the largest of its kind in Central Pennsylvania, and employs nearly 300 hands. The proposition to sell out will be placed before the directors of the company at their next meeting. Fair figures are quoted for the stock, but those at the head of the combine refuse to make known what disposition is to be made of the works if they are sold.

The Keystone Wheel Works, in York, were recently sold to John C. Tanger, at Sheriff's sale. The works will be operated as soon as repairs have been made.

A mortgage has been given by the Pullman Automatic Ventilator Company of York to the Security Title & Trust Company of New York, trustee, to the amount of $250,000. The mortgage was given to secure the issue of bonds of the Pullman Company to that amount and is a deed of trust upon all patents, franchises, assets and property of the corporation.

The big furnace at the plant of the South Chester Tube Company, which has been out of blast for seven weeks, will not be blown in until after the Christmas holidays, it is reported. Scarcity of coal and coke is the given cause. The little furnace has been in operation steadily with a limited supply of fuel.

Suit for damages has been entered at Allentown for the Palace Silk Mill Company against the American Steel & Wire Company. The plaintiffs claim that smoke from the mills of the steel company damaged the looms of the silk mill to the amount of thousands of dollars and ask redress at the hands of the court.

The iron for the extension of the new mill of the Standard Steel Company, at Burnham, has arrived and is being placed in position. The rush orders from the Baldwin Locomotive Works have caused activity at the new axle plant, and 25 hammers are being put in place there. All the hammering of forgings for the Baldwin Company will be done at this plant. The new open hearth is nearing completion and will be turning out 150 tons of steel a day within the next few months. The Standard Company will order five more shifting engines when the improvements at the Burnham plant are put in operation. At present the works are being pushed to their capacity on orders from the Baldwin Locomotive Works.

During the past two weeks the Frick Mfg. Company of Waynesboro have received 15 orders for ice making and refrigerating machines, varying in daily capacity from 4 to 150 tons. The works are rushed with orders and are little troubled by the fuel scarcity that is worrying other Cumberland Valley manufacturers.

The Wrightsville Hardware Company and the Susquehanna Casting Company last week booked orders that will keep their plants in operation for the next five or six months. The companies have suffered very little from the coal famine, and have made large shipments during the past three months.

After a long legal controversy over a piece of land at the Colebrook furnaces in West Lebanon Township, Lebanon County, the West Lebanon school district has deeded the tract to the Lackawanna Steel Company, who will come into possession next spring.

The Heine Safety Boiler Company of Phœnixville have purchased four acres of ground for the erection of shops. The purpose of the company is to double the plant. S.

The Scotch Iron and Coal Trades.

The Warrant Market.

GLASGOW, November 28, 1902.—In the iron trade here the sensational incident is the contest between the bulls and the bears in the warrant market, and even that attracts but languid interest outside the ring. It is remarkable that bears should go on selling short when they have to pay now as much as 3 shillings per ton and even 3 shillings 6 pence backwardation to carry over each account for a month. But they do, and besides paying the "carry over," sell more afterward. Every short sale is promptly bought by the bull party, although it is whispered the bulls have been quietly unloading while cornering the bears. This I doubt. Nearly all the speculative dealing is in Cleveland warrants, and there are only 116,500 tons of Cleveland iron now in the Middlesbrough warrant stores. That is a small quantity to hold and a quantity to hold profitably at 3 shillings per ton per month on the short sales, which may be now as much as 50,000 tons, though, of course, the state of the account varies from day to day, or at all events from week to week. So far as one can judge the bulk of the warrants are still held by the firm who are doing most business with America and who are believed to hold them on American account. It will naturally take a very heavy relapse in prices for the bears to secure a profit after paying two or three heavy carry over charges. And I do not see how there can be any material falling away for some time to come, considering the quantity still to be shipped to America on actual contracts, and even without further sales. The effect of the bearing of Cleveland warrants has been, after a sharp depression, to raise the price of them to 52 shillings for settlement purposes, while Scotch are 54 shillings, and Cumberland hematite 59 shillings 3 pence. Makers' price for No. 3 Cleveland, however, is 49 shillings 3 pence, and for Middlesbrough hematite 56 shillings 6 pence to 57 shillings. Scotch makers' prices are: Colteness, No. 1, 69 shillings 6 pence; No. 3, 60 shillings; Gartsherrie, No. 1, 65 shillings; No. 3, 59 shillings; Summerlee, No. 1, 69 shillings; No. 3, 59 shillings; Calder, No. 1, 65 shillings; No. 3, 59 shillings; Langloan, No. 1, 70 shillings; No. 3, 59 shillings; Clyde, No. 1, 64 shillings 6 pence; No. 3, 58 shillings 6 pence; Carnbroe, No. 1, 64 shillings; No. 3, 57 shillings; Govan, No. 3, 58 shillings 6 pence; Eglinton, No. 1, 60 shillings; No. 3, 56 shillings; Glengarnock, No. 1, 67 shillings 6 pence; No. 3, 57 shillings 6 pence; Dalmellington, No. 1, 60 shillings; No. 3, 56 shillings; Carron, No. 1, 68 shillings; No. 3, 59 shillings.

The Pig Iron Trade.

There is a considerable local consumption of pig iron in Scotland at present and large quantities are still being drawn from Cleveland. The total from that quarter is about 50,000 tons ahead of last year. No more is being got from Russia, but another cargo is coming in from Nova Scotia, partly in balance of an old contract with that supplemented. Pipe founders are buying crude iron pretty freely, having contracted well ahead in pipes. The shipments of Scotch pig iron are about 90,000 tons ahead of last year. Makers here are without stocks and the warrant stock is down to 26,000 tons. There are now 80 furnaces in blast in Scotland, or three more than

last year. In Cumberland two furnaces have been damped down this week owing to the difficulties of a manufacturing company there. In October there were 347 furnaces in blast in the United Kingdom, as compared with 346 in June, 343 in March and 340 in January, showing a progressive increase. The average weekly capacity per furnace is greater than last year, and it is being further increased. For the first half of the year the output of Scotland was only 456,000 tons, as against 475,000 tons in the first half of 1901, but with an average of only 78 furnaces in blast. The output of the second half will show a considerable increase. In Cleveland and allied district the output of the first half of the year was 1,470,539 tons, as compared with 1,394,094 tons in the corresponding portion of 1901.

There are quite a large number of steamers chartered which are still to load iron for the United States in the northeast and northwest of England. Scotch iron is going across every trip by the liners, as much as they can carry. A fortnight ago there were 14 steamers on charter to load during November up to about 44,000 tons, in addition to what had already sailed. Another boat was loading 4000 tons hematite at Barrow, and these engagements and the Glasgow shipments per liners would foot up about 75,000 tons. Last week and this week some ten more boats have been chartered, making in all over 100,000 tons for which freight engagements have been made for shipment this year. Further orders have come in for which tonnage has not yet been secured, and I calculate that by the end of December the year's shipments of pig iron to the United States will be close, if not quite, up to 500,000 tons, or about ten times the quantity in 1901. Moreover, within the last few days orders have been booked here for 15,000 to 20,000 tons, to be shipped to your side during the first six months of 1903. It is, however, the case that in the Midlands of England and in Wales pig iron is weaker in tone and easier in price.

The Finished Iron and Steel Trades.

Our finished iron and steel trades are by no means so brisk as they might be and the conditions are reviewed by some people with despondency. I do not think, however, that the picture is so black as has been painted. In the Cleveland district there is considerable dullness and quotations there are easy at £5 10s. for steel ship plates; steel angles, £5 10s.; iron ship plates, £6 5s.; common bars, £6 5s., all less 2½ per cent., and steel rails, £5 10s., net. To some extent these quotations affect Scotch makers, who, however, are fairly well employed on the whole; at any rate on shipbuilding material, although the outlook as regards shipbuilding is bad. It must be remembered that Scotland has sold a large quantity of crude and finished and partly finished steel to America during recent months and that much of this has yet to be made and shipped, besides what fresh orders are coming and may come in from your side. Here it may be noted that in the first six months of the year the Scotch output of open hearth steel was 523,786 tons, as compared with 493,404 tons in the first half of 1901. This gives Scotland the lead by a long way as the next largest producing district; the Northeast of England turned out only 435,004 tons owing to one of the works having been shut down. The whole output of the United Kingdom in the six months was 1,771,038 tons, as compared with 1,630,095 tons in the first half of last year, and the increase is all due to Scotland and Wales, though Wales is only the third largest producer, with 424,357 tons in the last half year increased from 316,440 tons last year. The average output of the Scotch steel furnaces is now at the rate of 12,800 tons per furnace per annum, while the English average is only about 11,000 tons. Scotland is the largest producer of acid steel ingots, the output in the six months ending June having been 514,977 tons, with only 8800 tons of basic steel. Staffordshire is the largest producer of open hearth basic steel, in six months turning out 97,029 tons, as compared with 70,821 tons in the corresponding portion of last year.

Another development of American industry in this country is the establishment of a factory in Scotland by the consolidated pneumatic tool manufacturers. The chairman of the British Board of Directors, A. W. Invernochie, M.P., is in Scotland just now arranging matters. He says that the factory is to be conducted on American methods under American managers. The site for it has been rather oddly chosen at Fraserburgh, which is a small fishing town on the seacoast of Aberdeenshire, at the mouth of the Moray Firth. It is a place and a district better acquainted with herring than with steel, and is far away from iron and coal and the manufacturing centers. This place has been chosen, according to the chairman of the company, "because of the climate, the kind of labor to be had and the remoteness from towns." The idea is to keep the workmen in good form by keeping them away from heated, unhealthy city life, in a bracing atmosphere, where rents and expenses are low. From a social point of view the experiment is highly interesting, but the transport charges on material and products will be a considerable item.

The Coal Trade.

I do not hear of any more orders for coal having come here from your side, but in Newcastle some 20,000 to 30,000 tons have been ordered within the last week or two of "unscreened steam" for prompt or early shipment to Boston. The compromise arranged in Wales to prevent a stoppage of work at the pits while the sliding scale question is being discussed, and the reference of the Midland miners' demand for an advance and of the Midland coal owners' demand for a reduction of wages to Lord James of Herefore as arbiter have steadied the markets. In Scotland there is a fair demand for best quotations of shipping coal and also for splint coal for gas making and for the iron furnaces, but for other sorts there is no great request. Prices all round are pretty much the same as they were at this time last year, but the shipments of Scotch coal to date are about 1,100,000 tons more than up to the corresponding date last year. To-day the arbiter in the Scotch wages dispute has awarded the miners an advance of 3 pence per day—that is, just one-half of what they asked.

B. T.

A Fire in the Chicago Machinery District.

(By Telegraph.)

CHICAGO, ILL., December 9, 1902.—A fire occurred on Monday, December 8, at 62 to 64 South Canal street, Chicago, the building being occupied as a warehouse by a number of firms interested in machinery, machine tools and boiler tubes, stoves and ranges, &c. The building was utilized as a store by Marshall & Huschart Machinery Company, and the following, among others, had property stored either in the burned house or in the adjoining building:

Schneider & Trenkamp, Westinghouse Electric Company, Joseph T. Ryerson & Son and the Reeves Pulley Company.

The damage to buildings is estimated at upward of $60,000, partially covered by insurance. The aggregate damage to stock sustained by all is estimated at $130,000, but there will probably be little loss, as nearly all firms were well covered by insurance, and there will probably be some salvage. The Marshall & Huschart Machinery Company report that there will be no interruption to the prompt filling of orders for machinery intrusted to their care, as they can make prompt shipment from the factory. They have established temporary offices at 60 South Canal street.

The Chicago Edison Company.—CHICAGO, ILL., December 9, 1902.—To meet the expense for improvements the directors of the Chicago Edison Company have voted to increase the capital stock of the company 30 per cent., to be issued during the coming year. The increased stock is to be offered to shareholders at par, and in round numbers will be $2,275,000, making a total outstanding capital of $9,866,571. The total authorized capital of the company is $10,000,000.

Notes from Great Britain.

Death of Sir William Roberts-Austen.

LONDON, November 28, 1902.—It would not be fitting to start my comments on the week's work without first mentioning the death of Sir William Roberts-Austen, who died this day week at the Mint. It is not necessary to recapitulate the facts of this man's busy life. Since 1861 he has been a persistent student and consistent worker, while his original work, particularly on the interpenetration of metals and the phenomena of recalescence, leaves the whole metal world under tribute to his memory. Honors fell thick and fast upon him. Unless I am mistaken, he worked for the love of it, for I believe he came into a valuable estate many years ago.

Another personal event of more than passing interest is the retirement of F. W. Webb from the position of Chief Mechanical Engineer to the London & North-Western Railway Company. It is pleasant to know, however, that the company are not to be deprived entirely of his services. It is rather more a case of slacking off. F. W. Webb entered the Crewe Works in 1851, as pupil of Francis Trevithick, son of the great Trevithick. He was chief draftsman by 1859, and works manager in 1861. In 1866 he resigned, and went to the Bolton Iron & Steel Company's works as manager, but in 1871 he returned to his first love. It may almost be said that the town of Crewe has grown out of the inspiration of F. W. Webb. During the years he was there the population has risen from 18,000 to over 40,000, and during the time no less than 4000 locomotives have been built. His name, of course, is associated with the compound system. He took out many patents, but never received royalties from the railway company, who, in recognition of his services, raised his salary from £5000 (the sum paid to his predecessor) to £7000 a year.

The Markets.

The official returns of the accountants, both for the North of England and Midland iron trade Wages Board, are to hand this week. In the North of England the net average price realized by the firms in the district for finished iron during September and October has caused some surprise, for though the trade is admittedly depressed and prices have undoubtedly been reduced, yet by the ascertainment iron rails have advanced 1 shilling 6.73 pence; plates, 2 shillings 4.9 pence; bars, 1 shilling 2.72 pence; angles 3 shillings 0.7 penny, while the aggregate increase is 1 shilling 8.33 pence. The ways of the market are sometimes past finding out, and here is a case in point. In accordance with a resolution dated July 31, 1902, the rate of wages for puddling remains 8 shilling 9 pence per ton basis price, and millmen's wages in proportion, to commence on Monday, December 8, 1902, and to continue until Saturday, February 7, 1903. The quantity of iron produced during the last two months was practically 2000 tons in excess of that in the corresponding period of last year, and the average selling price is 7 pence per ton advance upon the same period.

Notwithstanding these figures, I adhere to my previous statements that trade is depressed and that we are not far from a serious slump. Some weeks the ironmasters meet and are optimistic; next time they are equally down in the dumps. Prices remain as per those quoted last week, with a downward tendency for large orders on the one hand and on the other a marked disposition to "talk the market up," but there are not many large orders, and talking seldom has more than the merest transitory effect. Copper sheets have been reduced £2 a ton, and now stand at £64 10s., while a gathering depression is noted in the tin plate trade. The basis price for IC unassorted Siemens is 12 shilling 9 pence, charcoals selling from 14 shillings 6 pence to 22 shillings 6 pence. In the Black Country there is distinct anxiety among commercial men. West Bromwich, which is looked upon as one of the most important centers of the iron trade in South Staffordshire, has, like its near neighbors, shared in the ill effects of the depression.

The causes assigned for the present depression are very different from those which brought about a similar crisis some 16 or 17 years ago. Then it was openly admitted that the collapse of the trade in these parts was due to the competition of other districts and the invasion of the markets by foreign manufacturers. To-day the chief factors in the declining iron trade are, perhaps, even more serious. A West Bromwich manufacturer sums up the situation thus: The high price of fuel in West Bromwich crippled the iron trade, and the owners of forges have materially assisted in its downfall by failing to keep pace with the times and neglecting to provide up-to-date machinery. Those works which have been equipped with the best iron making appliances, it is remarked, are now in full swing, while those which have been left behind in the competition are either at a standstill or doing a dwindling trade. The manufacture of iron from the raw material is said to be showing most signs of decay, and there are now hundreds of puddling furnaces in and about West Bromwich standing idle.

Of course against this picture of apparently unrelieved blackness there are bright spots. For example, one hears that capitalists are contemplating laying down new well equipped works in the future, while Page's, one of the oldest iron making forges in the Black Country, is at present very busy, and Onions have started business in the Hill Top district. The present stationary position of West Bromwich is due largely to the closing of large collieries. Five years ago there were within the borough 20 collieries in full operation, with enormous assessments, while to-day there are only six.

Refusal of American Railway Wagons.

I hear that the Caledonian Railway Company, in order to experiment with the American system of dealing with traffic, which has been so largely advocated, ordered 20 wagons of 30-ton capacity from the United States builders. An official of the company has been seen in connection with the matter, and he stated that the Caledonian Company refused to accept delivery, as the material was rough and coarse, and the wagons looked like huge tanks on wheels badly put together. The wagons are lying waiting the American builders' orders at the Glasgow terminus.

British Success at Shanghai.

Two English houses have secured the contract for the construction and operation of the electric traction system to be built in the foreign settlement of Shanghai. The work will be completed by the end of 1904, and the cost will be $3,500,000. The Englishmen carried the contract against American competition.

German Government Support.

A remarkable instance showing how far German subvention of industry will go is mentioned by a French journal in connection with the recent French miners' strike. A manufacturer with a large business signed a contract with a German mine owner for coal to be delivered at his works near Paris at 16 francs a ton, this being about the same amount as he had been paying for French coal. At the request of the seller the coal was sent carriage forward, and the freight was deducted from the invoice. This freight worked out at 7 francs 20 cents a ton, leaving only 8 francs 80 cents for the mine owner—obviously an impossible price, coal of the same quality being worth at least 14 francs in the French mining districts. It can be readily inferred that the German Government, which is itself a carrier, inasmuch as most of the German railways belong to the State, officially applies the ordinary tariffs, but at the same time grants the producer a bonus, the amount of which is kept secret. This system has enabled many German mine owners to profit by the French strike and to obtain contracts extending over a long period in France. In reality they sell at less than cost price, but the Imperial finances meet the deficit and give the producer his profit as well. S. G. H.

The Iron Age

New York, Thursday, December 11, 1902.

DAVID WILLIAMS COMPANY, - - - - - - - PUBLISHERS.
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JOHN S. KING, - - - - - - - - - BUSINESS MANAGER.

The Regulation of "Trusts."

The thoughtful and intelligent man of affairs finds difficulty in taking quite seriously the flood of grave nonsense now finding its way into print, not merely as part of the ephemera of the daily newspaper work, but in State papers, which become part of history, concerning the measures needed to protect the American people against the evils of trusts. Industrious legislators are losing sleep in the study of the problem, and it may be assumed that many of this class are cherishing the ambition that to them will come the fame and political advantage of solving it and of pointing out the means by which the American people may be saved from the calamities which now menace them. The President has gravely communicated his views to Congress on this subject in his message, and in common with others who have endeavored to discuss it seriously has dealt in safe generalities which do not exactly glitter, but have the advantage which attached to the deliverances of the Delphic oracle, in depending for their meaning upon definitions which are not furnished. To threaten certain corporations with dire penalties is safe enough, so long as it is left to the individual citizen to determine according to his own standards of judgment which of the great industrial consolidations should be punished and which should not be. References to the misuse of corporate powers, to evil tendencies subversive of the public and business morality, to wrongdoers and to "what is bad in the existing system" are not enlightening unless we know or are assisted in judging which of a hundred or more so-called trusts invite condemnation for these potent reasons and which do not. It is doubtless impressive to denounce "monopolies;" but what is a monopoly and how many of the industrial consolidations are monopolies? Of those which admittedly are, how many have misused their advantages to the public detriment? "Fraudulent overcapitalization"—a strong and strenuous phrase, by the way—has an alarming sound and is calculated to set the timid investor to thinking; but he will naturally ask what is overcapitalization, and when does such overcapitalization become fraudulent? Until his mind is clear on these points his thinking is not likely to be very purposeful or profitable.

Nothing can be expected to come of this discussion until some one has the combination of intelligence and courage to put his finger on one representative trust and show that it is a monopoly, that its influence has been used to the public disadvantage, that it is fraudulently overcapitalized and for how much, and that it is a wicked conspiracy in restraint of trade. To this end it will be necessary to show not only that it is distasteful to its competitors, for the reason that having more enterprise and the command of more ample resources it is successful in doing what they are trying to do less successfully. The consumer is a factor of no inconsiderable consequence in the equation, and the inquiry would be incomplete and inconclusive unless it included the effect of trust operations upon prices through a period long enough to show whether the consumer was benefited or wronged by the control of production by the trust selected for the inquest. Possibly it may be found that some trusts are beneficent and others baneful; that some are promoting industrial progress in the highest degree and that others are holding it back; that in some cases there is a fair capitalization, while in others the overcapitalization is fraudulent. If so it would only serve to show that generalizations are dangerous and misleading when made from diverse and unrelated phenomena, and that before wise and conservative legislation is possible we have a great deal to learn as to the starting point, length and direction of the line which shall separate the sheep of the good trusts from the goats of the bad ones.

So far as intelligent public opinion has reached a conclusion on this subject, it probably accepts two general propositions respecting trusts—that fraudulent overcapitalization should be restrained and that the utmost publicity should be made a condition precedent to corporate existence. As usual, neither demand will bear the test of cold analysis in the light of facts. What is meant by publicity? It was part of the wisdom of the ancients, as crystallized in classic proverb, that error lurks in generalities. The late Thomas B. Reed, in his article in the *North American Review*, which is probably his last contribution to economic literature, says: "Almost everybody announces that we want publicity. Even this is vague. Do you expect the public to be intrusted with the cost sheets? If you do not, then what will your publicity amount to? If you mean by publicity such a statement as will enable the outsider to buy wisely or the stockholder to sell at the true value, I fear we may be going beyond the province of free government, which certainly thus far has left the task of keeping his fingers out of the fire to the citizen whose fingers they are." The people entitled to full information as to the organization and operations of the trusts, if any one is—the shareholders—are the ones who least need protection in the making or management of their investments and speculations. Where room for doubt exists as to the relation between assets and capitalization, common stock is, as the rule, given the benefit of the doubt. In the picturesque language of the street it is rated as "cats and dogs," and either let severely alone, or if purchased is taken at a figure so low as to seem a safe gamble.

Overcapitalization is represented in the common stock if anywhere. If the bond issues exceed the value of the assets nobody will buy them and consolidation would be impossible. If the preferred stock is not reasonably certain to earn the interest for which it is preferred its flotation will be found impossible. As to the common stock, it is within the truth to say that no one takes it quite seriously. If bought for speculative purposes it brings no more than it is believed to be worth. The explanation of this apparent anomaly is that the amount in promoters' hands is usually so large and the desire to convert it into money so eager that a very slight advance in price above the normal curb valuation brings the offer of so much of it that it is immediately depressed to the point at which such offers are withdrawn. Hence we see the common stock issues of admittedly solvent and prosperous consolidations quoted, if they have a price, from 10 to 37 per cent. of par. There are train loads of such stock in the safes and vaults of bankers, underwriters and promoters which the general public has shown no eagerness to buy; those who hold it cherish no illusions as to its real value; those who do not own it have no occasion to con-

cern themselves about it, one way or the other. It carries control if one has enough of it, but it entails no fixed charges and in no way weakens the security of the honest creditor. In the event of necessary reorganization it would be quietly and tenderly "wiped out," and the resulting loss would not be much, if anything, except as measured in what the poet has called "large desires with most uncertain issues."

Is it necessary to have recourse to legislation to squeeze the water out of stock issues? If one will take the stock reports and note the prices at which the shares of some of the great industrial mergers known as trusts are held, he will see that this process of drying has already been accomplished much more justly and certainly than it could be by act of Congress. If a share of one issue of common stock may be had for ten, it indicates that in the opinion of the shrewdest and most practical judges of value in the stock market this issue contains 90 per cent. of water. If it is held at 30 it is because the same or equally good judges believe that it carries dilution in the proportion of 70 parts in the 100. If it was possible for legislation to render such issues anhydrous the holders of shares advanced from 10 cents or 30 cents on the dollar of face value to par would profit nothing, since on any equitable plan of shrinkage they would have to contribute *pro rata* to the stock to be canceled, and the value of what remained would be unchanged. Ten shares worth 10 per cent. of par and one share worth par would seem to be pretty much the same thing so far as the holder is concerned.

Mr. Reed combined rare qualities of wisdom and humor in the following pregnant paragraph: "If the proposition is to press the oak back into the acorn, it had better be carefully considered. All we are trying to do is to sap the prosperity of institutions which have grown so large as to frighten us. Why do they frighten us? Because they are great and strong and wealthy. We so hate and fear large corporations that we will destroy prosperity rather than not destroy them. To argue such a proposition would be a discredit to the American people."

Experience has shown and is showing that there is a remedy for every evil; furthermore, that the courts are ready and willing to give patient hearing to complaints of purely imaginary wrongs and to right such as are found to have a tangible existence. Experience has not shown that because a corporation is great and rich and prosperous, and does an interstate business in a large way, it is for those reasons a danger to the public interest and a menace to the institutions of free government. Most of the talk which now engages public attention on this subject is idle vaporing and represents nothing of the smallest public interest. If some one is able to show good and sufficient reasons why so-called trusts should be persecuted and subjected to conditions and restrictions which would be deemed unjust and iniquitous in the case of smaller corporations, what he says will be entitled to thoughtful consideration. If any one can propose a plan of legislation which will automatically discriminate between good trusts and bad trusts and operate on the principle of the gun designed to kill if it was a deer and miss if it was a calf, he may be called a public benefactor. Until then the citizen who does his own thinking will be likely to remain skeptical as to the wisdom and sincerity of all this pother about trusts. Possibly, if he knows the facts, he may hold the belief that in several of the most important industries of the country the consolidation of competing plants averted for a long period, and perhaps permanently, conditions which if left to develop without interruption would have torn the country asunder in the throes of titanic death struggles. Your thoughtful citizen may not as yet have reached definite conclusions as to where the trend of events in the industrial world will lead, but he probably has the wisdom to see that the problem, if there be one, is not to be solved by generalizations, and that when in doubt as to what should be done the best policy is to do nothing.

The Administration and the Currency.

The Administration has now laid before the country three recommendations regarding the currency, and although it is unofficial the recommendations of the New York Chamber of Commerce may be grouped with these as a fourth prescription.

The President deems it inadvisable to reconstruct the financial system, but recognizes the occasion for some amendatory legislation, the character of which he does not define, though he states the general ends to be aimed at. Secretary Shaw advises an asset currency, not even secured by a first lien on the bank's assets, and limited to some percentage of the bank's capital. He also asks authority to deposit any of the Government funds in the banks. Comptroller Ridgely admits the defects inherent in a bond secured currency as frankly as the Secretary does, but cannot bring himself to recommend an asset currency. He only advocates an emergency currency, to amount to 20 per cent., to be ultimately raised to 50 per cent. of the bank's capital, which may be issued against general assets, but is to be so heavily taxed that the banks will not put it out unless there is a considerable stringency with a good prospect of its continuance.

Probably the best financial sentiment of the country is reflected in the report of its Finance Committee, on which were two ex-Secretaries of the Treasury, which was adopted almost unanimously by the Chamber of Commerce. This report recommended that the banks be permitted to retire their notes at will; the law preventing the retirement of more than $3,000,000 a month has actually restrained the banks from responding to the needs of their customers. The report suggests the issue of asset currency without changing the law regarding bond security; the redemption of silver dollars in gold, which will remove what slight trace of bimetallism remains on the statute books and complete the act of March 14, 1900, and authority to deposit any Government funds in the banks, subject to an interest charge of not less than 2 per cent. if the deposit is not secured by a deposit of bonds.

When the President said in his message that "it would be both unwise and unnecessary at this time to attempt to reconstruct our financial system, which has been the growth of a century," he implied that the growth was an orderly development with which it would be rash to interfere. The fact is that our financial system consists of a mass of laws superimposed one upon another, with little real unity. Each piece reflected the popular sentiment of its time and was framed to meet some particular exigency. It was pretty accurately described by Mr. Rhodes, who presented the committee report to the Chamber of Commerce, when he said that it is "made up of parts unrelated and heterogeneous, one created to bridge over a crisis and to give an artificial market to Government securities, another to meet an emergency, as in the demand for the purchase of silver bullion, and all permeated with the evils of fiat money."

For example, internal revenue collections may be de-

posited in the banks, but customs collections may not be. Mr. Rhodes' committee suggested as an explanation that in order to maintain the Government credit during the Civil War the duties were collected in gold and retained by the Treasury till required for the payment of interest. But the discrimination is probably little more than an accident. The prohibition of depositing public funds in banks was an expression of a popular, and then not wholly baseless, distrust of banks a long time before the Civil War. When the internal revenue system was established during the war the people had partly outgrown their distrust of banks and internal revenue collectors were located where there was no sub-Treasury. For these two reasons it was permitted to deposit internal revenue receipts in the banks, while customs receipts remained subject to the older law.

There is no organic unity in our financial system to deter the country from making changes in it, and while the politicians are still rather timid, the business sentiment of the country is moving pretty fast in the direction of an asset currency and the deposit of as much public money in the banks as the needs of business demand.

The Philadelphia Foundrymen's Association.

The one hundred and twenty-third meeting of the Philadelphia Foundrymen's Association was held at the Manufacturers' Club, 1409 Walnut street, in that city, Wednesday evening, December 3. The president, Thomas Devlin, who was elected for the ensuing term at the last meeting, occupied the chair and called the association to order at the usual time. Among those who were present may be mentioned the following:

Thos. Devlin, Thos. Devlin Mfg. Company, Philadelphia.
Richard Moldenke, secretary American Foundrymen's Association, New York.
Thos. I. Rankin, Abram Cox Stove Company, Philadelphia.
R. C. Oliphant, Trenton Malleable Iron Company, Trenton, N. J.
Wm. F. Neff, Baldwin Locomotive Works, Philadelphia.
F. E. Hemsher, J. H. Sheeler, H. A. May, Theo. B. Rohrman, Sheeler-Hemsher Company, Philadelphia.
Wm. F. Bernstein, Andrew McClay, Bernstein Mfg. Company, Philadelphia.
H. Armour Ward, J. S. L. Alexander, M. I. Ardrey, American Brazing Company, Philadelphia.
H. C. Matlack, Frank Samuel, Philadelphia.
Stanley G. Flagg, Jr., S. G. Flagg & Co., Philadelphia.
A. A. Miller, *The Iron Age*, Philadelphia.
Geo. C. Davis, chemist; W. L. Hallowell, Harrison Safety Boiler Works, Philadelphia.
E. E. Brown, C. R. Brown, E. E. Brown & Co., Philadelphia.
W. A. Devlin, H. O. Evans, Thos. Devlin Mfg. Company, Philadelphia.
Wm. Hanson, Pennsylvania Iron Works Company, Philadelphia.
J. Hy. Pepper, *Brass Founder and Finisher*, Philadelphia.
P. D. Wanner, Reading Foundry Company, Reading, Pa.
W. E. Arnold, L. & R. Wister & Co., Philadelphia.
E. M. Taggart, J. W. Paxson Company, Philadelphia.
Oregon J. Ward, Howe Scale Company, Philadelphia.
F. C. Pullman, J. Wesley Pullman, Philadelphia.
J. J. McCrystal, Girard Iron Works, Philadelphia.
T. B. Harkins, J. H. Brooks, T. B. Harkins Foundry Company, Bristol, Pa.
Chas. Link, Thos. Devlin Mfg. Company, Philadelphia.
Howard Evans, J. W. Paxson Company, Philadelphia.
A. E. Outerbridge, Jr., Wm. Sellers & Co., Philadelphia.

No business of particular moment was before the association. The treasurer reported a balance of $1994.22, and all bills paid. The application for membership of the Sheeler-Hemsher Company, brass founders, 811-815 Fairmount avenue, Philadelphia, was approved by the Executive Committee, and they were duly elected. Announcement was made by the secretary that a paper on "Overhead Tram Rails and Their Use in Connection with Foundry Work, &c.," would be one of the subjects for the January meeting.

The evening paper consisted of a talk on "Saving the Scrap Pile," by H. Armour Ward, president of the American Brazing Company of Philadelphia and New York. In the course of his remarks, Mr. Ward stated that the discovery of the process of brazing cast iron had changed the methods in European foundries with reference to complicated castings, especially in the case of large castings, where a flaw or imperfection of any kind involved the relegation of the piece to the scrap pile. The patterns are now cut into two or more parts, so that each is a simple piece to mold, and the several parts are brazed together, so that in effect when the brazing operation is complete the several pieces that make up the whole casting are as one entire casting, and the cost of production has been materially reduced, in that the cost of brazing is very much less than the cost of molding one large casting, as against two or more smaller pieces.

Mr. Ward explained that flaws in castings were eliminated by drilling them out if they were small and brazing a plug in made to fit the hole. If they were large and in the nature of a crack, if the crack was wide, a piece of any kind of iron was fitted into the space and brazed into place. If narrow the crack was cleaned out thoroughly and brazed up. If it could not be cleaned in this way the fracture was extended by hammering, until the entire break could be reached to clean, even if this involved breaking the piece entirely in two. The cost of the ferrofix involved was about ½ cent per square inch of surface brazed.

In tests made for the Government in Berlin, at the Stevens Institute in Hoboken, at the University of California and by the Pennsylvania Railroad, it had been demonstrated that the brazed joint was not only stronger than any portion of the casting of equal section, but that the iron adjacent to the joint had its strength increased perceptibly, the tensile strength being raised from 50 to 200 pounds and the transverse strength as much as 2000 pounds. It was believed that this was not due to any action of the chemical on the iron, but was entirely owing to the fact that in cooling down from the brazing heat this cooling down was much more rapid than when the casting was originally made, the effect on the iron being to increase its strength by reason of this more rapid cooling.

With the practice in Europe in mind, Mr. Ward asserted his belief that the introduction of this brazing process must affect shop practices here as radically as was the case there. As a result of his investigations in Germany, France and Belgium, Mr. Ward stated that in his judgment at least 75 per cent. of the flaws that ordinarily destroy the value of a casting could be eliminated, and the piece made sound and serviceable at a small fraction of the cost of remolding, and as one of the banes of the foundrymen's business was the loss accruing from imperfect castings, and this process seemed to solve the trouble to a very large extent, he hoped the gentlemen present would experiment with the process on such lines as they deemed requisite for adding to the knowledge of its use. The privilege of sending imperfect castings to the shops of the American Brazing Company for the purpose of noting the results of the work done was extended. Several small pieces were exhibited, but as there were no means of testing the strength of the joint, it could not be determined just how satisfactory the joints were for strength, although to all appearances the pieces were as sound and strong as if they had been molded perfectly.

Mr. Ward stated that the only difficulty encountered in doing large pieces was in cases where the casting was joined in such manner as to prevent free expansion when only a small portion of the casting adjacent to the fracture was heated. As castings of this peculiar character were not as commonly encountered as the other kind, the trouble arising from it was not so serious; and even in such castings, when the entire piece could be heated more or less, the brazing operation was successful.

The chief peculiarity of this process of brazing, as stated by Mr. Ward, is that it is always perfect when the work is properly done. Its simplicity and cheapness were remarkable in view of the fact that in brazing steel or brass an expert in the art is usually required

in order to insure having a good job, but in ferrofixing by the American Brazing Company's process no expert skill was required. The alignment of the piece was unchanged, the surfaces, whether machined or not, were not disturbed in any way, and after the completion of the brazing operation all that was necessary was to clean off the surplus brass, and the piece would be found as sound and true as a perfect casting.

Mr. Ward also said that several manufacturers in Germany were brazing brass heads on steel bolts, where conditions would permit this being done. Brass was required for appearance sake and steel for strength. The practice in the German shops, however, is to pay more attention to the looks of a machine than is the practice here.

In answer to inquiries made by several of the gentlemen present, Mr. Ward stated that this process of brazing would fasten any two metals together, except possibly in the case of aluminum. They had made no experiments in that direction, but meant to take the matter up just as soon as conditions would permit. His company had been so busy arranging for the introduction of the ferrofixing process to the iron trade that no opportunity had been reached that would allow them to make the aluminum experiments; but they expected to try this class of work in the near future, as the demand had been made upon them by several manufacturers and there seemed to be a general desire to know how the trials would come out.

A. E. Outerbridge, Jr., read an extract from an address made by him to the students in the Wharton School of Finance and Economy, of the University of Pennsylvania, dealing particularly on the "Premium System of Payment." This was an interesting subject and the paper in full will be published in the proceedings of the American Academy of Political and Social Science at an early date.

Dr. Richard Moldenke, secretary of the American Foundrymen's Association, addressed the meeting, telling briefly the aims of the association, the methods of reaching results, and also the prospective work of the organization.

The meeting then adjourned, after which the usual luncheon was served.

Lake Iron Ore Matters.

DULUTH, MINN., December 6, 1902.—Total shipments from all ranges for the year are given elsewhere. For Minnesota the mines have shipped as follows, the list including nearly all properties separately:

Vermillion Range.

	Tons.		Tons.
Chandler	645,000	Minnesota	280,000
Pioneer	675,000	Savoy	243,000
Sibley	77,000	Zenith	167,000

Mesaba Range.

	Tons.		Tons.
Adams	1,240,117	Auburn	38,200
Chisholm	250,000	Clark	300,000
Commodore	66,000	Day	106,037
Duluth	150,220	Ætna	190,796
Cloquet	22,803	Corsica	59,300
Burt	99,939	Biwabik	623,128
Elba	212,000	Fayal	1,920,000
Genoa	400,000	Glen	23,421
Franklin	84,500	Hawkins	10,000
Hale	54,300	Jordan	148,000
Hull	421,442	Kanawha	24,800
Lincoln	87,779	Mahoning	1,025,000
Malta	179,400	Minorca	35,500
Mountain	1,428,383	Oliver	5,131
La Belle	70,700	Pettit	17,300
Roberts	29,000	Rust	242,198
Sellers	192,234	Pillsbury	237,106
Sparta	254,800	Spruce	512,562
Stevenson	1,450,000	Union	103,500
Victoria	26,500	Wills	12,000
		Other mines	925,000

Winter Explorations.

Explorations for iron have been commenced about half way between the international boundary and Port Arthur, southwest of the latter point some 45 miles, by M. A. Hanna & Co. They have diamond drills in place and at work and have crews of explorers, and propose to make a thorough exploration of the ground during the winter. This is a far easterly extension of the Mesaba range, and the surface indications are the regular Mesaba formation. Some ore has been found, and it is claimed that some hematite has been cut into. The region contains a good deal more of the overlying trap than the valuable portion of the range. It is a district that has not been looked on with favor, and has not been explored at all.

A decision was made in the United States Circuit Court last week in the case of one 40-acre tract of the famous Section 30, Vermillion range, which 40 had not been included in the original decree of the United States Supreme Court, for the reason that there was no one whom the scrip owners could sue until after the main case had gone up. The decision was in favor of the scrip locatees, in line with that of the highest court. It is not known whether or not this latest case will be appealed, but appeal would seem to be useless. No agreement appears to have been arrived at between these owners and any mining or exploring company as to the noted land. No exploration has commenced there, and none is likely for some time, considering the terms that the owners are said to demand. But there will be a lot of exploring on the range this winter in other locations, and the general expectation is that some new ore will be found.

Old Furnaces Revived.

The old blast furnace at Newberry, on the south side of Lake Superior, west of the Sault, is being rebuilt and enlarged, and 40 large charcoal ovens are under way. The new owners of the furnace, of whom Berry Bros. of Detroit lead, have bought some 19,000 acres of hard wood lands, into which railroad spurs are now being run in order to get out the wood, and they have under option about 80,000 acres more. They are understood to have timber lands sufficient to run the furnace at enlarged capacity for at least 20 years. They will have there one of the largest alcohol plants in the United States. The old furnace at St. Ignace, a few miles further east, which has been under repair and enlargement for some time, is to blow in within two or three weeks. This is also a charcoal plant.

Scattering Items.

At the Helen Mine, Michipicoton range, they have ceased shipments, with an output for the year of 350,000 tons. This is less than expected, on account in part of the difficulty of changing methods of mining during a shipping season. They are now 120 feet underground with a shaft, sunk on the edge of the old lake bed, which has been pumped dry, and are driving into the ore there. Not far from the Helen Mine the Clergue syndicate has found a large deposit of pyrites, running very high in sulphur, which they are now arranging to sell to sulphite works in the United States. A contract for a large annual shipment of this material is being made.

The Chicago, Milwaukee & St. Paul Road, which has just closed its first year of ore shipping from the Crystal Falls district, has moved there about 500,000 tons. The road has been moving about 6000 tons a day from the Bristol stockpile for the past week or two.

Iron River shipments have been about 215,000 tons by the Oliver Iron Mining Company, 70,000 by Pickands, Mather & Co. and smaller amounts by others. The Baltic stockpile will not be shipped, but those at Dober, Riverton and Hiawatha have been cleaned up and ground is being prepared for large piles this winter. Indications point to the Hennepin making a large mine. It joins the Tobin. Pumps of a total capacity of 3000 gallons a minute are being installed in the new shaft at Aragon, where much water is expected shortly.

The Copper Region.

Mohawk copper mine is the latest to start up its mill, and is now running its two stamps successfully. The mill is a duplicate of that of Wolverine, situated a few hundred feet distant on Traverse Bay, and recently started. Mohawk Rock is expected to run a trifle better than its near neighbors, and a good future seems assured. The mill will be one of the most economical in operation in the lake district. This mine may now be said to be a developed property and an active producer.

Sault Canal business for November amounted to 4,133,038 tons of freight, making for the year to Decem-

ber 1 a total of 35,064,251 tons passed up or down. The largest items of the season have been iron ore, 21,402,140 gross tons, 96,160,324 bushels of grain, 1,073,637,000 feet of lumber, 8,456,056 barrels of flour, 4,561,050 tons of coal, 113,448 tons of copper, &c. So recently as 1893 the total tonnage of this waterway amounted to only 10,796,000 tons. This year it will probably be 36,000,000 tons. D. E. W.

MANUFACTURING.

Iron and Steel.

Old Alcalde Furnace, Rusk, Texas, was blown out November 10 for new bosh.

Carbon Furnace of the Carbon Iron & Steel Company, at Parryville, Pa., was blown in November 10, after being banked 32 days.

Rebecca Furnace of the Kittanning Iron & Steel Mfg. Company, at Kittanning, Pa., is out for relining and other repairs. The stack is expected to go in soon after the holidays.

Mannie Furnace of the Bon Air Coal & Iron Company, at Mannie, Tenn., was blown out November 15 for repairs.

The smaller Brooke Furnace of the E. & G. Brooke Iron Company, Birdsboro, Pa., was blown in November 18.

Furnace "K," the new stack at the Edgar Thomson plant of the Carnegie Steel Company, at Bessemer, was blown in on schedule time on December 5. All records for erection of blast furnaces have been broken in the building of this furnace, which was erected in just six months from the time work was started. It was built entirely by the Carnegie Steel Company, and a number of the men were offered prizes if they succeeded in having the stack finished and blown in within six months from the time work was started. This was accomplished in the face of considerable delay in getting materials. Furnace "K" is 28 x 85 feet in size and is expected to make about 400 tons of iron per day.

Haselton Furnace of the Republic Iron & Steel Company, at Youngstown, Ohio, is banked on account of scarcity of coke. The furnace will hardly be started until after the first of the year, and in the meantime some slight repairs will be made. Their Haselton works are also idle for want of pig iron and the plant is undergoing some necessary repairs.

Mary Furnace of the Ohio Iron & Steel Company, at Lowellville, Ohio, which has been banked for about two weeks for want of coke, is again in operation. The company are interested in the Orient Coal & Coke Company, recently organized in Pittsburgh, to build coke ovens in the Connellsville region, and expect within the next six months to have their own supply of coke, making them independent of the market.

At the Sharon tin plate works of the Union Steel Company, at Sharon, Pa., six more mills have been started, making 16 in operation. This plant is to contain 20 mills, and the other four will be started after the first of the year.

The output of the blast furnace at Charlotte, N. Y., is said to be about 700 tons a week. Improvements are in progress which will bring the output up to about 1400 tons a week.

The Cumberland Steel Company, Cumberland, Md., are now building new machinery that will increase their output 50 per cent. The present plant has been fully occupied filling orders of the domestic trade, and it has been found necessary, to take advantage of business to be had from the foreign field, already established, to increase their manufacturing facilities.

The Berlin Construction Company, Berlin, Conn., are reported to have secured the contract for rebuilding the plant of the Portland Iron & Steel Company, Portland, Maine, which was destroyed by fire some months ago.

The new bar mill of the Ohio Steel & Iron Specialty Company, Cuyahoga Falls, Ohio, will be in operation on or before January 10. The mill has six new furnaces, with a capacity of 150 tons per day They are specially prepared to furnish material for quick welding and the general blacksmith trade.

The Mackie Steel Tube Mfg. Company of Chicago and Hammond, Ind., are enlarging their plant at Hammond for the manufacture of steel tubing. They have recently placed on the market a square steel tubing made by a new process, which much reduces the cost of manufacture, the advantage being shared with consumers. The tubing is made in various gauges and sizes and is particularly adapted to the manufacture of iron beds, architectural and agricultural shapes and automobiles. An important feature of the tubing is that it can be bent in scrolls and various shapes to conform to the present style of iron beds. The satisfactory orders received by the company have prompted them to make preparations for running the works at night as well as by day. In a short time they expect also to manufacture seamless tubing for boilers, automobiles, &c., ranging from ⅞ to 4 inches in diameter.

It is hardly probable that the consolidation of the Union Steel Company of Pittsburgh and the Sharon Steel Company of Sharon, Pa., will become effective before January 1, if then. The new Union Steel Company will build 200 bee-hive coke ovens in the lower Connellsville region, the product of which will be used in the new blast furnaces now being built by the Union Steel Company, at Donora, Pa. J. D. Brennan has been appointed superintendent of the coke works.

It is officially denied that the Elliott-Blair Rolled Steel Company will remove their plant from New Castle, Pa., to Washington, Pa. No move of this kind is contemplated at the present time.

The Clairton Steel Company of Pittsburgh, a subsidiary interest of the Crucible Steel Company of America, have started up their eighth furnace at their open hearth plant at Clairton, Pa. This plant is to have 12 furnaces and the other four will be started after the first of the year. One of the blast furnaces being built by the St. Clair Furnace Company will probably be ready for blast early in January.

The Carnegie Steel Company are rolling at their Edgar Thomson Steel Works, at Bessemer, 10,000 tons of 90-pound steel rails for the Wabash Railroad, which is being built into Pittsburgh.

In order to secure an unbroken frontage along the Monongahela River at McKeesport, Pa., the United State Steel Corporation are trying to purchase the property of the Monongahela River Consolidated Coal & Coke Company, on Riverton street. The corporation now own a very large frontage on the Monongahela River, and if successful in securing this additional property will have sufficient ground to allow of extensive improvements and additions to be made to the National Works of the National Tube Company and the W. Dewees Wood Works of the American Sheet Steel Company.

The blast furnace of the Struthers Furnace Company, at Struthers, Ohio, has been closed down on account of shortage in coke.

The Maryland Sheet Steel Company, Cumberland, Md. manufacturers of sheets, plates and forgings, have increased their capital stock from $50,000 to $100,000. They have recently added considerable new equipment and are also erecting a new open hearth furnace, and the additional capital is to be used to cover these improvements and additions.

The Virginia Iron, Coal & Coke Company, Bristol, Va., in the hands of a receiver since 1901, have been reorganized with $10,000,000 capital. Henry K. McHarg is president, Archer A. Phlegar vice-president and John C. Newton general manager. On January 1 the offices of the company will be moved from Bristol to Radford, Va.

General Machinery.

The Greensburg Foundry & Machine Company, Greensburg, Pa., owing to their rapidly increasing business, have been compelled to get larger quarters, and for this purpose they have purchased the Gondola Works of Jeannette, Pa., with 13 acres of ground. The company will have in their new location two foundry buildings, one 73 x 103 feet, the other 73 x 164 feet; one wagon making and blacksmith shop, 75 x 60 feet; machine shop, 60 feet square; pattern shop, three stories high and 46 feet square, for the exclusive use of storing patterns; tool house, 40 x 30 feet, and storage house, 40 feet square, as well as other smaller buildings. They expect to be established in their new location within 60 days and will employ about 100 men at the start, and this number will be greatly increased. They are manufacturers of boilers, engines, pumps, steel mine cars, wagons, car wheels, &c., and expect to turn out from 25 to 40 tons of castings per day. The buildings are now about ready for the installation of new machinery. The officials are: Thomas Donohoe, Jr., president; M. A. Prugh, secretary and treasurer, and W. W. Truxell, general superintendent.

The Boston Bolt Company, 33 Purchase street, Boston, Mass., will move their plant after January 1 to South Boston, and their offices and salesrooms to 284 Franklin street.

The American Furnace & Machine Company, engineers and contractors, Publication Building, Pittsburgh, have received an order from the Sharon Steel Company, Sharon, Pa., for six Swindell annealing chargers. The Sharon Steel Company have had 12 sets of these chargers in use for nearly two years, and the fact that they have placed a contract for six more of the same type indicates that they are thoroughly pleased with the charger. The American Furnace & Machine Company received a contract on September 17 for 11 Swindell water seal gas producers, to be erected at the new plant of the United Steel Company, Canton, Ohio. These gas producers were fully completed on November 21, only two months after receipt of the order, and in these times of delay in receiving material and freight congestion, the building of these gas producers was accomplished in a remarkably short period.

The Buffalo Forge Company have acquired the capital stock of the George L. Squier Mfg. Company and the business of the two concerns will be merged. The Squier Company manufacture plantation machinery for use in the sugar, coffee and rice regions. It is one of the largest concerns of the kind in the country. The business will go on as before.

Norris, Burnham & Co., Incorporated, Glen Rock, Pa., founders and machinists, have extended their machine shop to 285 feet in length, and have built a brick addition in which have been installed large tumbling barrels. In the machine shop

a boring mill, key seaters and a number of other new machines have been added. In the blacksmith shop a number of Buffalo down draft forges have been installed. The entire plant will be driven by independent motors of the General Electric make.

The Cambridge Electric Light Company of Cambridge, Mass., have purchased from the Westinghouse Electric & Mfg. Company 99 induction motors, 11 motors of 1 horse-power, 26 motors of 2 horse-power, 9 motors of 3 horse-power, 19 motors of 5 horse-power, 25 motors of 7½ horse-power and 9 motors of 15 horse-power.

In these columns last week we noted the fact that the Brown Hoisting Machinery Company of Cleveland, through their Pittsburgh office, H. C. Torrance, manager, had secured a contract for the erection of an automatic unloading, conveying, storing and filling plant at the blast furnaces of the Sharon Steel Company, Sharon, Pa. The plant will include a car dumper, which picks up a railroad car of 50 tons carrying capacity and dumps the load into a transfer bin, from there to be dropped into two 7½-ton capacity buckets on a transfer car and carried into three buckets over bridges, 300 feet long, to storage bins or a pile, whence the grab buckets take it to the furnace. The plant will include two bridges and will be of capacity to store and feed all the ore required in the three furnaces operated at South Sharon. The mechanism will unload 300 railway cars, or as high as 15,000 tons, in a ten-hour day. The Brown Hoisting Machinery Company have already installed a cantilever bridge at the South Sharon Works.

The Pusey & Jones Company, Wilmington, Del., have contracted to build $36,000 worth of paper machinery for Sweden manufacturers.

The Cincinnati Traction Company, Cincinnati, Ohio, are enlarging their car building plant and installing considerable new machinery. It is their intention to put the plant in the best possible condition for the building of all kinds of city and interurban electric cars, orders for a number of which they have on their books. The wood working machinery was furnished by the J. A. Fay & Eagan Company, Cordesman Machine Company, M. L. Andrew & Co., Cincinnati, Ohio; S. A. Woods Machine Company, Boston, Mass.; Greenlee Bros. & Co., Chicago, Ill.; blacksmith equipment by the Ajax Mfg. Company, Cleveland, Ohio; air compressors by the Christensen Engineering Company, Milwaukee, Wis.

The National Loom & Wire Company of Enfield, Conn., have incorporated with a capital stock of $100,000 for the manufacture of looms, machinery and wire. Their specialty will be a patented improvement in wire weaving looms. Oscar S. Greenleaf of Springfield, Mass., is interested.

The recently organized Rockhill Machine Company, Roanoke, Va., have secured a two-story brick building, 50 x 100 feet, which they are equipping for the building and repairing of machinery. They expect to be ready for business by January 1. The machinery was furnished by the Corey Machinery & Supply Company, Baltimore, Md.; Smith-Courtney Company, Richmond, Va., and the American Machine Tool Company, Cincinnati, Ohio. H. B. Rockhill is president.

The works of the Uneeda Tool & Machinery Company, at Martins Ferry, Ohio, have been purchased by some Pittsburgh parties, and the plant will likely be removed to that city. The company were organized about a year ago and George Reese is president.

Letson & Burpee, Fairhaven, Wash., recently purchased several acres of ground in Seattle upon which they will erect a plant for the manufacture of machinery used in canning salmon. The purchase price for the ground alone is placed at $15,000. Construction of the buildings will be begun soon.

The United Engineering & Foundry Company of Pittsburgh, builders of rolls, rolling mill machinery, sheet and tin plate mills, are building a 16-inch mill for Ricardo Honey of Mexico City, Mexico. This mill will be motor driven. They are also building for him a 26-inch motor driven roll lathe and a large motor driven lever shear.

The new plant of the Lima Locomotive & Machine Company, at Lima, Ohio, will shortly commence operations in all departments. It is expected the plant will employ nearly 1000 men.

The large factory building in Cleveland occupied by Bardons & Oliver, manufacturers of turret lathes, was totally destroyed by fire on December 4. The company had a large shipment of machinery about to be sent out, and this was destroyed. For some time past the firm have had a building site in the downtown section of the city, and they have been waiting for a decline in the price of material before erecting a large plant they had already planned. They will now probably erect this plant as soon as possible, and in the meantime they are occupying temporary quarters.

The Interstate Engineering Company, a company just incorporated with $300,000 capital stock, are preparing to erect a large structural steel plant at Bedford, a short distance from Cleveland. The company have purchased 45 acres of land on the Northfield road, not far from the Pennsylvania railway, and options have been obtained on more land, for a plant which is said will be one of the largest of its kind in the country. The main building, or structural shop, will be 600 x 160 feet, and there will also be a foundry, 400 x 120 feet; a machine shop of the same dimensions and a large forge shop; also an office building. It is expected the plant will employ 600 men. At a recent meeting of the Bedford Council a resolution was adopted authorizing an issue of bonds to pay the cost of building a fine road to the site of the plant. The chief promotors of the enterprise are the engineering firm of Kaltenbach & Griess of Cleveland, who have engineered a large amount of heavy work in the vicinity of Cleveland. The new company will start with many large contracts. Incorporators were: Paul Schneider of Bedford, J. W. Kaltenbach, J. Griess, C. A. Klump and Martin Mullen of Cleveland.

Boilers, Engines, &c.

Emmet Snipes, secretary commissioners, Searcy, Ark., is receiving bids until December 26 for the installation of municipal water works and an electric plant.

Proposals for the construction of water works and an electric plant will be received by the Mayor and Board of Aldermen of Springfield, Tenn., until December 15. H. T. Stratton is mayor.

The Board of Water Works Trustees of Wellsville, Ohio, will receive bids until December 16 for two 2,000,000-gallon triplex single acting pumps, two 175 horse-power gas engines and a 20-ton hand power traveling crane.

The public works budget of Nashville, Tenn, for 1903 includes a sum for the purchase of two additional boilers for the electric light plant.

Dravo, Doyle & Co., dealers in second-hand machinery, Lewis Block, Pittsburgh, report the following sales of the Cochrane feed water heater and purifier: Union Steel Company, Donora, Pa., 12,000 horse-power, special construction; Franklin Rolling Mill & Foundry Company, Franklin, Pa., 500 horse-power; Elyria Iron & Steel Company, Elyria, Ohio, 1500 horse-power; Jones & Laughlin Steel Company, Pittsburgh, Pa., 5000 horse-power; Superior Iron & Steel Company, Sault Ste. Marie, Ont., 3000 horse-power; 1000 horse-power to Cleveland and 750 horse-power to Fremont, Ohio; 600 horse-power to Phillipsburg, Pa.; also 450 horse-power Sorge-Cochrane system to New Kensington, Pa. Engine and boiler sales were: Two 16 x 14 direct connected Ball engines to Pittsburgh Spring & Steel Company, Pittsburgh; one 60 horse-power Union Iron Works locomotive type boiler to United States Government, at Pittsburgh; one 11 x 18 x 16 tandem compound and one 9½ x 10 Ball engine to Cleveland, Ohio; two 60 x 16 Union Iron Works boilers to Naomi, Pa., and one 200 horse-power to New Kensington, Pa.; one 12 x 12 Ball engine to Pittsburgh.

N. C. Davison, Frick Building, Pittsburgh, has sold a 20 horse-power Bessemer gas engine to the John Dunlap Company, Carnegie, for electric lighting purposes; a 15 horse-power commercial gas engine to the Monongahela Foundry Company, and a 35 horse-power commercial gas engine to the Monongahela Connecting Railway Company.

Clark Bros., Belmont, N. Y., builders of automatic and Corliss stationary engines and heavy saw mill machinery, have incorporated as the Clark Brothers Company with a capital stock of $250,000. The company are doubling the capacity of their plant.

The McAleenan Boiler Company of Peoria, Ill., have decided to increase the capital stock of the company from $25,000 to $100,000.

The Fostoria Home Heating & Lighting Company, Fostoria, Ohio, have obtained a franchise and will proceed at once with the erection of an electric lighting and steam heating plant. J. S. and J. W. Barber of Columbus, Ohio, are at the head of the company.

E. P. Roberts & Co., Cleveland, electrical engineers, are placing contracts for the equipment of the Dayton & Muncie Traction Company. A large power station is to be erected.

Foundries.

The Pennsylvania Malleable Company of Pittsburgh, with works at McKee's Rocks, Pa., did not join the new malleable iron consolidation formed last week. This concern turned out at their McKee's Rocks works last month over 1500 tons of castings.

James J. Lasey & Co., Baltimore, Md., will build a new brick foundry, 51 x 53 feet.

The United States Cast Iron Pipe & Foundry Company, New York, are stated to have just completed the largest contract for cast iron pipe ever executed in this country, having finished the delivery of 18 miles of 4-foot water mains for the Borough of Brooklyn.

The report that Thomas Carlin's Sons Company, founders and machinists, Allegheny, Pa., would remove their plant to some other location is officially denied. At the present time they are very much enlarging their foundry and machine shops and will spend over $50,000 in making extensions and improvements.

The new foundry and cupola house to be erected at South Boston, Mass., by the Walworth Mfg. Company, will occupy more than 1½ acres. The foundry building will be 90 x 300 feet, of brick construction, and will cost about $50,000.

J. H. Horne & Sons, Lawrence, Mass., manufacturers of paper mill machinery, have purchased adjoining property upon which they intend to erect a substantial addition to their foundry. It is probable that the machine shop will also be enlarged.

As already announced in these columns, the Meadville Malleable Iron Company, Meadville, Pa., have increased their capital stock from $100,000 to $150,000. They advise us that it is their intention to double their present output.

S. H. Stupakoff of the Fullman Company of Pittsburgh, and others, have organized the Stupakoff Foundry & Machine Company. A site has been purchased on the Allegheny Valley Railroad in Pittsburgh, and a small building on the property will be converted into a foundry. Machine shops will also probably be erected.

The Toledo Castings Company, Toledo, Ohio, have placed contracts for their new foundry, and ground will be broken at once. The building will be 65 x 150 feet and will be erected at Birmingham, near Toledo. The company are associated with the Detroit railway supply house of Leach & Co., and will produce many of their goods.

Oscar Krebs of Ottawa, Ohio, is preparing to establish a foundry in that place. He claims he will produce castings of all kinds.

Bridges and Buildings.

The Virginia Bridge & Iron Company, Roanoke, Va., have been unable to take care of the business offered, though they have materially increased the capacity of their plant within the past two years. They advise us that they expect to make further extensive enlargements during the coming year.

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a boring mill, key seaters and a number of other new machines have been added. In the blacksmith shop a number of Buffalo down draft forges have been installed. The entire plant will be driven by independent motors of the General Electric make.

The Cambridge Electric Light Company of Cambridge, Mass., have purchased from the Westinghouse Electric & Mfg. Company 99 induction motors, 11 motors of 1 horse-power, 26 motors of 2 horse-power, 9 motors of 3 horse-power, 19 motors of 5 horse-power, 25 motors of 7½ horse-power and 9 motors of 15 horse-power.

In these columns last week we noted the fact that the Brown Hoisting Machinery Company of Cleveland, through their Pittsburgh office, H. C. Torrance, manager, had secured a contract for the erection of an automatic unloading, conveying, storing and filling plant at the blast furnaces of the Sharon Steel Company, Sharon, Pa. The plant will include a car dumper, which picks up a railroad car of 50 tons carrying capacity and dumps the load into a transfer bin, from there to be dropped into two 7½-ton capacity buckets on a transfer car and carried into three buckets over bridges, 300 feet long, to storage bins or a pile, whence the grab buckets take it to the furnace. The plant will include two bridges and will be of capacity to store and feed all the ore required in the three furnaces operated at South Sharon. The mechanism will unload 300 railway cars, or as high as 15,000 tons, in a ten-hour day. The Brown Hoisting Machinery Company have already installed a cantilever bridge at the South Sharon Works.

The Pusey & Jones Company, Wilmington, Del., have contracted to build $36,000 worth of paper machinery for Sweden manufacturers.

The Cincinnati Traction Company, Cincinnati, Ohio, are enlarging their car building plant and installing considerable new machinery. It is their intention to put the plant in the best possible condition for the building of all kinds of city and interurban electric cars, orders for a number of which they have on their books. The wood working machinery was furnished by the J. A. Fay & Eagan Company, Cordesman Machine Company, M. L. Andrew & Co., Cincinnati, Ohio; S. A. Woods Machine Company, Boston, Mass.; Greenlee Bros. & Co., Chicago, Ill.; blacksmith equipment by the Ajax Mfg. Company, Cleveland, Ohio; air compressors by the Christensen Engineering Company, Milwaukee, Wis.

The National Loom & Wire Company of Enfield, Conn., have incorporated with a capital stock of $100,000 for the manufacture of looms, machinery and wire. Their specialty will be a patented improvement in wire weaving looms. Oscar S. Greenleaf of Springfield, Mass., is interested.

The recently organized Rockhill Machine Company, Roanoke, Va., have secured a two-story brick building, 50 x 100 feet, which they are equipping for the building and repairing of machinery. They expect to be ready for business by January 1. The machinery was furnished by the Corey Machinery & Supply Company, Baltimore, Md.; Smith-Courtney Company, Richmond, Va., and the American Machine Tool Company, Cincinnati, Ohio. H. B. Rockhill is president.

The works of the Uneeda Tool & Machinery Company, at Martins Ferry, Ohio, have been purchased by some Pittsburgh parties, and the plant will likely be removed to that city. The company were organized about a year ago and George Reese is president.

Letson & Burpee, Fairhaven, Wash., recently purchased several acres of ground in Seattle upon which they will erect a plant for the manufacture of machinery used in canning salmon. The purchase price for the ground alone is placed at $15,000. Construction of the buildings will be begun soon.

The United Engineering & Foundry Company of Pittsburgh, builders of rolls, rolling mill machinery, sheet and tin plate mills, are building a 16-inch mill for Ricardo Honey of Mexico City, Mexico. This mill will be motor driven. They are also building for him a 26-inch motor driven roll lathe and a large motor driven lever shear.

The new plant of the Lima Locomotive & Machine Company, at Lima, Ohio, will shortly commence operations in all departments. It is expected the plant will employ nearly 1000 men.

The large factory building in Cleveland occupied by Bardons & Oliver, manufacturers of turret lathes, was totally destroyed by fire on December 4. The company had a large shipment of machinery about to be sent out, and this was destroyed. For some time past the firm have had a building site in the downtown section of the city, and they have been waiting for a decline in the price of material before erecting a large plant they had already planned. They will now probably erect this plant as soon as possible, and in the meantime they are occupying temporary quarters.

The Interstate Engineering Company, a company just incorporated with $300,000 capital stock, are preparing to erect a large structural steel plant at Bedford, a short distance from Cleveland. The company have purchased 45 acres of land on the Northfield road, not far from the Pennsylvania railway, and options have been obtained on more land, for a plant which is said will be one of the largest of its kind in the country. The main building, or structural shop, will be 600 x 160 feet, and there will also be a foundry, 400 x 120 feet; a machine shop of the same dimensions and a large forge shop; also an office building. It is expected the plant will employ 600 men. At a recent meeting of the Bedford Council a resolution was adopted authorizing an issue of bonds to pay the cost of building a fine road to the site of the plant. The chief promotors of the enterprise are the engineering firm of Kaltenbach & Griess of Cleveland, who have engineered a large amount of heavy work in the vicinity of Cleveland. The new company will start with many large contracts. Incorporators were: Paul Schneider of Bedford, J. W. Kaltenbach, J. Griess, C. A. Klump and Martin Mullen of Cleveland.

Boilers, Engines, &c.

Emmet Snipes, secretary commissioners, Searcy, Ark., is receiving bids until December 26 for the installation of municipal water works and an electric plant.

Proposals for the construction of water works and an electric plant will be received by the Mayor and Board of Aldermen of Springfield, Tenn., until December 15. H. T. Stratton is mayor.

The Board of Water Works Trustees of Wellsville, Ohio, will receive bids until December 16 for two 2,000,000-gallon triplex single acting pumps, two 175 horse-power gas engines and a 20-ton hand power traveling crane.

The public works budget of Nashville, Tenn, for 1903 includes a sum for the purchase of two additional boilers for the electric light plant.

Dravo, Doyle & Co., dealers in second-hand machinery, Lewis Block, Pittsburgh, report the following sales of the Cochrane feed water heater and purifier: Union Steel Company, Donora, Pa., 12,000 horse-power, special construction; Franklin Rolling Mill & Foundry Company, Franklin, Pa., 500 horse-power; Elyria Iron & Steel Company, Elyria, Ohio, 1500 horse-power; Jones & Laughlin Steel Company, Pittsburgh, Pa., 5000 horse-power; Superior Iron & Steel Company, Sault Ste. Marie, Ont., 3000 horse-power; 1000 horse-power to Cleveland and 750 horse-power to Fremont, Ohio; 600 horse-power to Phillipsburg, Pa.; also 450 horse-power Sorge-Cochrane system to New Kensington, Pa. Engine and boiler sales were: Two 16 x 14 direct connected Ball engines to Pittsburgh Spring & Steel Company, Pittsburgh; one 60 horse-power Union Iron Works locomotive type boiler to United States Government, at Pittsburgh; one 11 x 18 x 16 tandem compound and one 9½ x 10 Ball engine to Cleveland, Ohio; two 60 x 16 Union Iron Works boilers to Naomi, Pa., and one 200 horse-power to New Kensington, Pa.; one 12 x 12 Ball engine to Pittsburgh.

N. C. Davison, Frick Building, Pittsburgh, has sold a 20 horse-power Bessemer gas engine to the John Dunlap Company, Carnegie, for electric lighting purposes; a 15 horse-power commercial gas engine to the Monongahela Foundry Company, and a 35 horse-power commercial gas engine to the Monongahela Connecting Railway Company.

Clark Bros., Belmont, N. Y., builders of automatic and Corliss stationary engines and heavy saw mill machinery, have incorporated as the Clark Brothers Company with a capital stock of $250,000. The company are doubling the capacity of their plant.

The McAleenan Boiler Company of Peoria, Ill., have decided to increase the capital stock of the company from $25,000 to $100,000.

The Fostoria Home Heating & Lighting Company, Fostoria, Ohio, have obtained a franchise and will proceed at once with the erection of an electric lighting and steam heating plant. J. S. and J. W. Barber of Columbus, Ohio, are at the head of the company.

E. P. Roberts & Co., Cleveland, electrical engineers, are placing contracts for the equipment of the Dayton & Muncie Traction Company. A large power station is to be erected.

Foundries.

The Pennsylvania Malleable Company of Pittsburgh, with works at McKee's Rocks, Pa., did not join the new malleable iron consolidation formed last week. This concern turned out at their McKee's Rocks works last month over 1500 tons of castings.

James J. Lasey & Co., Baltimore, Md., will build a new brick foundry, 51 x 53 feet.

The United States Cast Iron Pipe & Foundry Company, New York, are stated to have just completed the largest contract for cast iron pipe ever executed in this country, having finished the delivery of 18 miles of 4-foot water mains for the Borough of Brooklyn.

The report that Thomas Carlin's Sons Company, founders and machinists, Allegheny, Pa., would remove their plant to some other location is officially denied. At the present time they are very much enlarging their foundry and machine shops and will spend over $50,000 in making extensions and improvements.

The new foundry and cupola house to be erected at South Boston, Mass., by the Walworth Mfg. Company, will occupy more than 1½ acres. The foundry building will be 90 x 300 feet, of brick construction, and will cost about $50,000.

J. H. Horne & Sons, Lawrence, Mass., manufacturers of paper mill machinery, have purchased adjoining property upon which they intend to erect a substantial addition to their foundry. It is probable that the machine shop will also be enlarged.

As already announced in these columns, the Meadville Malleable Iron Company, Meadville, Pa., have increased their capital stock from $100,000 to $150,000. They advise us that it is their intention to double their present output.

S. H. Stupakoff of the Fullman Company of Pittsburgh, and others, have organized the Stupakoff Foundry & Machine Company. A site has been purchased on the Allegheny Valley Railroad in Pittsburgh, and a small building on the property will be converted into a foundry. Machine shops will also probably be erected.

The Toledo Castings Company, Toledo, Ohio, have placed contracts for their new foundry, and ground will be broken at once. The building will be 65 x 150 feet and will be erected at Birmingham, near Toledo. The company are associated with the Detroit railway supply house of Leach & Co., and will produce many of their goods.

Oscar Krebs of Ottawa, Ohio, is preparing to establish a foundry in that place. He claims he will produce castings of all kinds.

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The Johns-Pratt Company, Hartford, Conn., manufacturers of electric supplies, will erect two additions to their plant, each building being 32 x 70 feet and two stories high. All equipment has been secured.

The Washington Coal & Coke Company, N. P. Hyndman, sales manager, Conestoga Building, Pittsburgh, have taken a contract for supplying 500 to 600 tons of coal per day for the Coke ovens at the Douglass Works of the H. C. Frick Coke Company, opposite West Newton, Pa. Also a contract for 500 to 600 tons of coal per day for the by-product coke ovens of the Maryland Steel Company, at Sparrows Point, Md. This contract runs for one year and the coal will be shipped in cars furnished by the Maryland Steel Company.

The plant of the Illinois Car & Equipment Company at Urbana, Ohio, has passed into the hands of the Illinois Car Company of Chicago. The plant, which heretofore has been used largely in the repairing of cars, will be in charge of H. E. McCord of Chicago, and it is stated that in the future new cars will be built at Urbana and that the capacity of the plant will be increased.

The Goodwin-Johnson Mfg. Company of Urbana, Ohio, have succeeded the Goodwin & Leonard Mfg. Company of Decatur, Ind., and the plant will be removed to Urbana, where they will continue the Goodwin hand oiler and a new sterilizing outfit.

The statement that the entire product of the Pressed Steel Car Company, at Pittsburgh, would be taken for the next 60 days by the Pennsylvania Railroad is not quite correct. The facts are that the daily output of steel cars at the two Pittsburgh Works of the Pressed Steel Car Company is about 125 cars, and of this output probably 100 cars daily will be made for the Pennsylvania Railroad. The Pressed Steel Car Company have very large orders for steel cars for the Pennsylvania, and these will be delivered as fast as possible.

John W. and Robert Garland, Frick Building, Pittsburgh, are among the promoters of the West Pittsburgh Stone & Cement Company, which will be incorporated with a capital stock of $1,000,000. The new company will build a plant in West Pittsburgh, near New Castle, Pa. John M. Cunningham will be the engineer.

The Carbon Limestone Company, New Castle, Pa., recently put in a compressed air Ingersoll-Sergeant drill and have spent about $12,000 in this new improvement. This is the first compressed air drill used in the Valleys for the quarrying of limestone.

The United States Fire Proofing Corporation of Pittsburgh will have an exhibit at the International Fire Exhibition to be given at Earl's Court, London, England, from May 1 to October 1, 1903. The exhibit will consist of all kinds of fire proofing used in building construction. The exhibition is under the auspices of the British Fire Prevention Committee. All foreign countries will be represented by exhibitions and awards will be given to a limited number. The company have secured a contract for furnishing the fire proofing for the Land Title Building in Philadelphia. The contract will require about 5000 tons.

The Champion Iron Company of Kenton, Ohio, have been given a contract for furnishing the steel for the prison cells for a new jail to be erected at Clarksburg, W. Va. The contract price is $30,000.

The F. B. Stearns Company of Cleveland have been incorporated under the laws of West Virginia with $200,000 capital stock. They are engaged in the manufacture of gasoline automobiles and are preparing to erect a building which will more than double their present capacity.

The Autocar Company, Ardmore, Pa., manufacturers of motor vehicles, have in the past two years greatly increased the capacity of their plant by the erection of two additions, 46 x 68 feet and 82 x 100 feet, respectively. They are now constructing a three-story building, 52 x 100 feet, which will be used for a finished assembly room, paint shop and stock room, and which will enable the company to increase their output from 12 to 20 cars per week.

The Cambridge Stampings & Enameling Company of Cambridge, Ohio, are considering a proposition to remove their plant to New Philadelphia. The Board of Trade of that place have offered a site and a bonus.

The Warren Sheet Metal Company, organized last month at Warren, Ohio, are erecting their buildings, the first one of which will be 42 x 108 feet. Machinery will be installed as speedily as possible after the buildings are ready. The officers of the Warren Sheet Metal Company are: W. C. Winfield, president; C. O. Hart, vice-president; C. B. Selby, secretary and treasurer, and C. A. Crane, general manager. These, with William Wallace, form the Board of Directors.

The Rowley Lead Company, St. Louis, Mo., recently incorporated with a capital stock of $250,000, have leased a large building, which they are equipping for the manufacture of white lead. The officers are: M. Shaughnessy, president; H. V. Kent, vice-president, and Wilson H. Rowley, secretary and treasurer.

The H. Adler Company of Pittsburgh have applied for a charter of incorporation with a capital of $100,000. The new company will take over the present business of the H. Adler Company, a partnership, manufacturers of gas stoves and gas heating appliances, with works at Carnegie, Pa.

The Standard Steel Car Company of Pittsburgh, whose new steel car works at Butler, Pa., are now turning out 50 to 60 steel cars per day, have recently placed contracts for a large amount of new equipment, which will increase the output to about 80 cars per day, 50 of which will be all steel and 30 wooden cars with metal underframes. The new equipment consists principally of punches, riveters and cranes.

The Jackson Iron & Metal Company of Jackson, Mich., have opened a stock yard at that place for scrap iron and other metals.

The Smith Mfg. Company, Waynesboro, Pa., are now well filled up with orders. Among the most important is the furnishing of 10,000 feet of iron picket fence, 5 feet high, for a Brooklyn, New York, park.

The plant of the E. Stebbins Mfg. Company, brass founders and finishers, and manufacturers of plumbers' brass goods, at Springfield, Mass., will be sold at auction on December 27. The plant is situated on the Boston & Maine Railroad and is completely equipped.

The long idle plant of the Youngstown Car Mfg. Company, at Youngstown, Ohio, has been bought by some Pittsburgh capitalists. The plant will be overhauled, a good deal of new equipment added, and will be put in first-class shape for the manufacture of wooden cars. George T. Oliver of Pittsburgh has been made president.

Higher West Bound Freight Rates.

In the revision of west bound rates on iron and steel, &c., the following have been agreed upon by the Trunk Line Freight Committee to go into effect on January 1. They are in line with those east bound, previously adopted by the Central Freight Association:

Pig iron, mill cinder and scale, car lots, on basis of $4.62 per gross ton, New York to Chicago.

Billets, blooms, borings, crop ends, ingots, muck or puddle bars, old car wheels and axles, old rails, scrap iron or steel, scrap tin and slabs, car lots, on basis of $4.95 per gross ton, New York to Chicago.

On ingot molds, car lots, on basis of $4.95 per net ton, New York to Chicago.

On ferromanganese, spiegel iron or spiegeleisen, manganese ore, zinc skimmings or sal ammoniac skimmings (in packages), zinc dross, zinc ashes, ferrosilicon, tin dross, lead dross and ferrophosphorus, car lots, on basis of $4.95 per gross ton, New York to Chicago.

On articles by the special iron tariff on basis of 33 cents less than car lots, and 27½ cents car lots, New York to Chicago. From New York, with usual differences from other Eastern cities, as follows:

	Cents per 100 pounds.	
	L. C. L.	C. L.
To New Orleans	55	48
To Memphis	42	35
To Nashville	40	34

The foregoing rates will apply, except where the regular tariff rate under the official classification is less.

Pig iron, mill cinder and scales, car lots, from Lebanon, Harrisburg and Steelton, Pa., to Pittsburgh, $2.10 per gross ton.

Billets (only), car lots, from Pittsburgh to Trenton, Phillipsburg and High Bridge, N. J., $2.50 per gross ton.

Car wheels, not attached to axles, in carloads, from Buffalo to Paterson, N. J., 13 cents, and to Schenectady, 10 cents per 100 pounds.

Scrap iron in carloads from Wilkes-Barre, Scranton and Carbondale to Montreal, $3.50 per gross ton; Olean and Bradford to Erie, per gross ton, $1.60; to Cleveland, $1.95; to Mahoning and Shenango Valleys, $1.95.

It is the understanding that the advanced billet rates will be made effective on January 1, between the specific points to and from which carload billet rates are authorized on the following articles in carloads:

Tin plate bars, sheet bars, pipe iron or pipe steel in lengths of 12 feet or over (to be used in the manufacture of pipe), wire rods in coils, unfinished, not drawn through a die, chain iron in coils and not drawn through a die.

An Increase in Pig Iron Producing Capacity.

Largely through the blowing in of blast furnaces in the territory affected by the anthracite coal strike, the capacity for the production of pig iron has been increased. Unfortunately, however, the difficulties of securing coke have very seriously affected the Central West, and the actual output is not up to quantity in normal times. This is very well reflected in the figures for the production during November, in connection with which it must be taken into account that the month had only 30 days. A very large number of producers report to us that they were stopped for longer or shorter periods, waiting for coke.

The weekly capacity of the furnaces in blast on December 1 compares as follows with that of the preceding periods:

	Total capacity per week. Gross tons.	Coke capacity per week.	Charcoal capacity per week.
December 1, 1902	343,581	336,617	6,964
November 1	337,559	330,110	7,449
October 1	345,048	337,837	7,211
September 1	335,189	328,243	6,946
August 1	336,465	328,745	7,720
July 1	350,890	343,250	7,640
June 1	344,748	337,492	7,256
May 1	352,064	337,627	6,437
April 1	337,424	331,140	6,284
March 1	323,028	316,039	6,989
February 1	332,045	325,440	6,605
January 1	298,460	291,992	6,468
December 1, 1901	324,761	317,358	7,403
November 1	320,824	313,775	7,049
October 1	307,982	300,538	7,444
September 1	299,861	293,256	6,605
August 1	303,847	297,269	6,578
July 1	310,950	303,793	7,157
June 1	314,505	306,391	7,514
May 1	301,125	293,915	7,210
April 1	296,676	288,766	7,910
March 1	292,899	284,825	8,074
February 1	278,258	278,258	8,335
January 1	250,351	243,254	7,097
December 1, 1900	228,846	222,067	6,779
November 1	215,304	207,381	7,923
October 1	223,169	214,921	8,248
September 1	231,778	223,551	8,227
August 1	244,426	236,131	8,295
July 1	283,413	274,921	8,492
June 1	296,376	288,771	7,605
May 1	293,850	286,956	6,894
April 1	289,482	281,644	7,838

Production of Pig Iron.—Gross Tons.

	July, 1902.	August, 1902.	September, 1902.	October, 1902.	November, 1902.
New York	32,816	34,450	28,053	30,105	28,912
New Jersey	12,880	15,032	10,617	8,375	14,218
Schuylkill	45,329	39,208	34,417	31,915	41,129
Lehigh	38,972	38,980	34,224	28,661	39,580
Susq. and Lebanon	49,362	47,332	41,371	37,849	38,225
Pittsburgh	356,777	355,524	348,362	380,261	359,662
Shenango	101,823	104,903	118,827	112,823	93,186
W. Penn	90,618	88,943	85,152	83,827	77,326
Md., Va. and Ky.	75,770	75,499	80,337	84,759	89,074
Wheeling	69,649	74,436	71,897	80,791	59,149
Cent. and No. Ohio	105,463	114,108	107,522	113,842	109,263
Mahoning V.	116,175	112,302	105,482	112,978	107,838
Hanging Rock and Hocking Valley	23,677	27,185	21,668	27,026	27,656
Ill., Wis., Minn., Mo. and Col.	200,599	190,989	181,830	189,970	172,485
Alabama	90,562	120,370	118,669	116,337	137,280
Tennessee	31,386	29,004	30,172	41,422	37,887
	1,441,858	1,468,165	1,418,600	1,480,941	1,432,879
Charcoal pig.	34,038	30,677	28,834	33,037	31,544
Totals	1,475,896	1,498,842	1,447,434	1,513,978	1,464,423

The status of the anthracite and coke furnaces was as follows on December 1, as compared with the preceding month:

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	December 1. Number of stacks.	December 1. Number in blast.	December 1. Capacity per week.	November 1. Number in blast.	November 1. Capacity per week.
New York	14	7	7,346	6	6,797
New Jersey	6	4	3,317	4	3,390
Spiegel	3	0	0	0	0
Pennsylvania:					
Lehigh Valley	28	20	9,891	12	6,475
Spiegel	1	0	0	0	0
Schuylkill Valley	14	12	10,328	7	7,189
Low. Susquehanna	10	7	5,457	7	4,503
Lebanon Valley	12	5	3,456	6	3,986
Pittsburgh District	33	32	83,222	32	84,542
Spiegel	1	1	699	1	553
Shenango Valley	19	14	21,242	14	22,050
West. Pennsylvania	21	16	18,043	15	17,549
Maryland	5	4	5,916	4	6,202
Wheeling District	11	10	13,801	10	18,242
Ohio:					
Mahoning Valley	15	12	25,891	12	23,709
Cent. and Northern	14	13	24,828	13	25,704
Hocking Valley	3	2	500	2	518
Hanging Rock	11	10	6,166	9	5,607
Illinois	19	14	30,401	15	31,913
Spiegel	1	1	1,007	1	800
Minnesota	1	0	0	0	0
Wisconsin	5	4	4,387	5	4,865
Missouri	1	1	695	1	651
Colorado	4	4	4,519	3	4,500
The South:					
Virginia	23	18	12,406	16	10,486
Kentucky	7	6	2,528	6	2,450
Alabama	40	34	32,034	32	28,016
Tennessee	16	14	8,537	15	9,413
Totals	337	265	336,617	248	330,110

There were blown in during November, Franklin in New York, Oxford in New Jersey, one Brooke, two Henry Clay, Leesport, and one Warwick in the Schuylkill Valley, one Allentown Iron Works, Carbon, Macungie, two Hokendauqua, one Keystone and one Saucon, in the Lehigh Valley, one Dunbar in Western Pennsylvania, Goshen and one Crozer in Virginia, one Wellston in the Hanging Rock region and Anna in the Mahoning Valley. There were blown out, Spring Valley in Wisconsin, Mary in the Mahoning Valley and one Mannie in Tennessee.

The status of the charcoal furnaces was as follows:

Charcoal Furnaces in Blast.

Location of furnaces.	December 1. Number of stacks.	December 1. No. in blast	December 1. Capacity per week.	November 1. No. in blast.	November 1. Capacity per week.
New England	7	3	248	3	250
New York	3	1	311	2	676
Pennsylvania	5	3	130	2	90
Maryland	1	0	0	0	0
Virginia	3	2	104	2	98
Ohio	8	4	152	4	226
Kentucky	3	0	0	0	0
Tennessee	1	0	0	0	0
Georgia	4	3	893	3	882
Alabama	5	5	1,639	5	1,778
Michigan, Missouri and Wisconsin	10	8	3,387	8	3,199
Texas	4	0	0	1	150
Washington	1	1	100	1	100
Totals	55	30	6,964	31	7,449

Stocks.

The position of furnace stocks, sold and unsold, as reported to us, was as below on December 1, as compared with the five preceding months, the same furnaces being represented as in former months. This does not include the holdings of the steel works producing their own iron:

Stocks.	July 1.	Aug. 1.	Sept. 1.	Oct. 1.	Nov. 1.	Dec. 1.
Anthracite and Coke	61,312	64,059	63,666	62,651	62,261	85,606
Charcoal	13,725	13,071	15,873	13,250	9,597	8,689
Totals	75,037	77,130	79,539	75,901	71,858	94,295

It is understood that the accumulation of stock at some of the coke furnaces is due to the inability to secure cars for shipment.

The Fort Pitt Spring & Mfg. Company of Pittsburgh have applied for a charter.

The structural material for an iron plant at Gadsden, Ala., has been placed abroad.

The Johns-Pratt Company, Hartford, Conn., manufacturers of electric supplies, will erect two additions to their plant, each building being 32 x 70 feet and two stories high. All equipment has been secured.

The Washington Coal & Coke Company, N. P. Hyndman, sales manager, Conestoga Building, Pittsburgh, have taken a contract for supplying 500 to 600 tons of coal per day for the Coke ovens at the Douglass Works of the H. C. Frick Coke Company, opposite West Newton, Pa. Also a contract for 500 to 600 tons of coal per day for the by-product coke ovens of the Maryland Steel Company, at Sparrows Point, Md. This contract runs for one year and the coal will be shipped in cars furnished by the Maryland Steel Company.

The plant of the Illinois Car & Equipment Company at Urbana, Ohio, has passed into the hands of the Illinois Car Company of Chicago. The plant, which heretofore has been used largely in the repairing of cars, will be in charge of H. E. McCord of Chicago, and it is stated that in the future new cars will be built at Urbana and that the capacity of the plant will be increased.

The Goodwin-Johnson Mfg. Company of Urbana, Ohio, have succeeded the Goodwin & Leonard Mfg. Company of Decatur, Ind., and the plant will be removed to Urbana, where they will continue the Goodwin hand oiler and a new sterilizing outfit.

The statement that the entire product of the Pressed Steel Car Company, at Pittsburgh, would be taken for the next 60 days by the Pennsylvania Railroad is not quite correct. The facts are that the daily output of steel cars at the two Pittsburgh Works of the Pressed Steel Car Company is about 125 cars, and of this output probably 100 cars daily will be made for the Pennsylvania Railroad. The Pressed Steel Car Company have very large orders for steel cars for the Pennsylvania, and these will be delivered as fast as possible.

John W. and Robert Garland, Frick Building, Pittsburgh, are among the promoters of the West Pittsburgh Stone & Cement Company, which will be incorporated with a capital stock of $1,000,000. The new company will build a plant in West Pittsburgh, near New Castle, Pa. John M. Cunningham will be the engineer.

The Carbon Limestone Company, New Castle, Pa., recently put in a compressed air Ingersoll-Sergeant drill and have spent about $12,000 in this new improvement. This is the first compressed air drill used in the Valleys for the quarrying of limestone.

The United States Fire Proofing Corporation of Pittsburgh will have an exhibit at the International Fire Exhibition to be given at Earl's Court, London, England, from May 1 to October 1, 1903. The exhibit will consist of all kinds of fire proofing used in building construction. The exhibition is under the auspices of the British Fire Prevention Committee. All foreign countries will be represented by exhibitions and awards will be given to a limited number. The company have secured a contract for furnishing the fire proofing for the Land Title Building in Philadelphia. The contract will require about 5000 tons.

The Champion Iron Company of Kenton, Ohio, have been given a contract for furnishing the steel for the prison cells for a new jail to be erected at Clarksburg, W. Va. The contract price is $30,000.

The F. B. Stearns Company of Cleveland have been incorporated under the laws of West Virginia with $200,000 capital stock. They are engaged in the manufacture of gasoline automobiles and are preparing to erect a building which will more than double their present capacity.

The Autocar Company, Ardmore, Pa., manufacturers of motor vehicles, have in the past two years greatly increased the capacity of their plant by the erection of two additions, 46 x 68 feet and 82 x 100 feet, respectively. They are now constructing a three-story building, 52 x 100 feet, which will be used for a finished assembly room, paint shop and stock room, and which will enable the company to increase their output from 12 to 20 cars per week.

The Cambridge Stampings & Enameling Company of Cambridge, Ohio, are considering a proposition to remove their plant to New Philadelphia. The Board of Trade of that place have offered a site and a bonus.

The Warren Sheet Metal Company, organized last month at Warren, Ohio, are erecting their buildings, the first one of which will be 42 x 108 feet. Machinery will be installed as speedily as possible after the buildings are ready. The officers of the Warren Sheet Metal Company are: W. C. Winfield, president; C. O. Hart, vice-president; C. B. Selby, secretary and treasurer, and C. A. Crane, general manager. These, with William Wallace, form the Board of Directors.

The Rowley Lead Company, St. Louis, Mo., recently incorporated with a capital stock of $250,000, have leased a large building, which they are equipping for the manufacture of white lead. The officers are: M. Shaughnessy, president; H. V. Kent, vice-president, and Wilson H. Rowley, secretary and treasurer.

The H. Adler Company of Pittsburgh have applied for a charter of incorporation with a capital of $100,000. The new company will take over the present business of the H. Adler Company, a partnership, manufacturers of gas stoves and gas heating appliances, with works at Carnegie, Pa.

The Standard Steel Car Company of Pittsburgh, whose new steel car works at Butler, Pa., are now turning out 50 to 60 steel cars per day, have recently placed contracts for a large amount of new equipment, which will increase the output to about 80 cars per day, 50 of which will be all steel and 30 wooden cars with metal underframes. The new equipment consists principally of punches, riveters and cranes.

The Jackson Iron & Metal Company of Jackson, Mich., have opened a stock yard at that place for scrap iron and other metals.

The Smith Mfg. Company, Waynesboro, Pa., are now well filled up with orders. Among the most important is the furnishing of 10,000 feet of iron picket fence, 5 feet high, for a Brooklyn, New York, park.

The plant of the E. Stebbins Mfg. Company, brass founders and finishers, and manufacturers of plumbers' brass goods, at Springfield, Mass., will be sold at auction on December 27. The plant is situated on the Boston & Maine Railroad and is completely equipped.

The long idle plant of the Youngstown Car Mfg. Company, at Youngstown, Ohio, has been bought by some Pittsburgh capitalists. The plant will be overhauled, a good deal of new equipment added, and will be put in first-class shape for the manufacture of wooden cars. George T. Oliver of Pittsburgh has been made president.

Higher West Bound Freight Rates.

In the revision of west bound rates on iron and steel, &c., the following have been agreed upon by the Trunk Line Freight Committee to go into effect on January 1. They are in line with those east bound, previously adopted by the Central Freight Association:

Pig iron, mill cinder and scale, car lots, on basis of $4.62 per gross ton, New York to Chicago.

Billets, blooms, borings, crop ends, ingots, muck or puddle bars, old car wheels and axles, old rails, scrap iron or steel, scrap tin and slabs, car lots, on basis of $4.95 per gross ton, New York to Chicago.

On ingot molds, car lots, on basis of $4.95 per net ton, New York to Chicago.

On ferromanganese, spiegel iron or spiegeleisen, manganese ore, zinc skimmings or sal ammoniac skimmings (in packages), zinc dross, zinc ashes, ferrosilicon, tin dross, lead dross and ferrophosphorus, car lots, on basis of $4.95 per gross ton, New York to Chicago.

On articles by the special iron tariff on basis of 33 cents less than car lots, and 27½ cents car lots, New York to Chicago. From New York, with usual differences from other Eastern cities, as follows:

	Cents per 100 pounds. L. C. L.	C. L.
To New Orleans	55	48
To Memphis	42	35
To Nashville	40	34

The foregoing rates will apply, except where the regular tariff rate under the official classification is less.

Pig iron, mill cinder and scales, car lots, from Lebanon, Harrisburg and Steelton, Pa., to Pittsburgh, $2.10 per gross ton.

Billets (only), car lots, from Pittsburgh to Trenton, Phillipsburg and High Bridge, N. J., $2.50 per gross ton.

Car wheels, not attached to axles, in carloads, from Buffalo to Paterson, N. J., 13 cents, and to Schenectady, 10 cents per 100 pounds.

Scrap iron in carloads from Wilkes-Barre, Scranton and Carbondale to Montreal, $3.50 per gross ton; Olean and Bradford to Erie, per gross ton, $1.60; to Cleveland, $1.95; to Mahoning and Shenango Valleys, $1.95.

It is the understanding that the advanced billet rates will be made effective on January 1, between the specific points to and from which carload billet rates are authorized on the following articles in carloads:

Tin plate bars, sheet bars, pipe iron or pipe steel in lengths of 12 feet or over (to be used in the manufacture of pipe), wire rods in coils, unfinished, not drawn through a die, chain iron in coils and not drawn through a die.

An Increase in Pig Iron Producing Capacity.

Largely through the blowing in of blast furnaces in the territory affected by the anthracite coal strike, the capacity for the production of pig iron has been increased. Unfortunately, however, the difficulties of securing coke have very seriously affected the Central West, and the actual output is not up to quantity in normal times. This is very well reflected in the figures for the production during November, in connection with which it must be taken into account that the month had only 30 days. A very large number of producers report to us that they were stopped for longer or shorter periods, waiting for coke.

The weekly capacity of the furnaces in blast on December 1 compares as follows with that of the preceding periods:

	Total capacity per week. Gross tons.	Coke capacity per week.	Charcoal capacity per week.
December 1, 1902	343,581	336,617	6,964
November 1	337,559	330,110	7,449
October 1	345,048	337,837	7,211
September 1	335,189	328,243	6,946
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December 1, 1900	228,846	222,067	6,779
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September 1	231,778	223,551	8,227
August 1	244,426	236,131	8,295
July 1	283,413	274,921	8,492
June 1	296,376	288,771	7,605
May 1	293,850	286,956	6,894
April 1	289,482	281,644	7,838

Production of Pig Iron.—Gross Tons.

	July, 1902.	August, 1902.	September, 1902.	October, 1902.	November, 1902.
New York	32,816	34,450	28,053	30,105	28,912
New Jersey	12,880	15,032	10,617	8,375	14,218
Schuylkill	45,329	39,208	34,417	31,915	41,129
Lehigh	38,972	38,980	34,224	28,661	39,580
Susq. and Lebanon	49,362	47,332	41,371	37,849	38,225
Pittsburgh	356,777	355,524	348,362	380,261	359,662
Shenango	101,823	104,903	118,827	112,823	93,186
W. Penn	90,618	88,943	85,152	83,827	77,326
Md., Va. and Ky.	75,770	75,499	80,337	84,759	89,074
Wheeling	69,649	74,436	71,897	80,791	59,149
Cent. and No. Ohio	105,463	114,108	107,522	113,842	109,263
Mahoning V.	116,175	112,302	105,482	112,978	107,838
Hanging Rock and Hocking Valley	23,677	27,185	21,668	27,026	27,656
Ill., Wis., Minn., Mo. and Col.	200,599	190,989	181,830	189,970	172,485
Alabama	90,562	120,370	118,669	116,337	137,289
Tennessee	31,386	29,004	30,172	41,422	37,887
	1,441,858	1,468,165	1,418,600	1,480,941	1,432,879
Charcoal pig	34,038	30,677	28,834	33,037	31,544
Totals	1,475,896	1,498,842	1,447,434	1,513,978	1,464,423

The status of the anthracite and coke furnaces was as follows on December 1, as compared with the preceding month:

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	December 1. Number of stacks.	December 1. Number in blast.	December 1. Capacity per week.	November 1. Number in blast.	November 1. Capacity per week.
New York	14	7	7,346	6	6,797
New Jersey	6	4	3,817	4	3,390
Spiegel	3	0	0	0	0
Pennsylvania:					
Lehigh Valley	28	20	9,891	12	6,475
Spiegel	1	0	0	0	0
Schuylkill Valley	14	12	10,328	7	7,189
Low. Susquehanna	10	7	5,457	7	4,503
Lebanon Valley	12	5	3,456	6	3,986
Pittsburgh District	33	32	83,222	32	84,542
Spiegel	1	1	699	1	553
Shenango Valley	19	14	21,242	14	22,050
West. Pennsylvania	21	16	18,043	15	17,549
Maryland	5	4	5,916	4	6,202
Wheeling District	11	10	13,801	10	18,242
Ohio:					
Mahoning Valley	15	12	25,891	12	23,709
Cent. and Northern	14	13	24,828	13	25,704
Hocking Valley	3	2	500	2	518
Hanging Rock	11	10	6,166	9	5,607
Illinois	19	14	30,401	15	31,913
Spiegel	1	1	1,007	1	800
Minnesota	1	0	0	0	0
Wisconsin	5	4	4,387	5	4,865
Missouri	1	1	695	1	651
Colorado	4	4	4,519	3	4,500
The South:					
Virginia	23	18	12,406	16	10,486
Kentucky	7	6	2,528	6	2,450
Alabama	40	34	32,034	32	28,016
Tennessee	16	14	8,537	15	9,413
Totals	337	265	336,617	248	330,110

There were blown in during November, Franklin in New York, Oxford in New Jersey, one Brooke, two Henry Clay, Leesport, and one Warwick in the Schuylkill Valley, one Allentown Iron Works, Carbon, Macungie, two Hokendauqua, one Keystone and one Saucon, in the Lehigh Valley, one Dunbar in Western Pennsylvania, Goshen and one Crozer in Virginia, one Wellston in the Hanging Rock region and Anna in the Mahoning Valley. There were blown out, Spring Valley in Wisconsin, Mary in the Mahoning Valley and one Mannie in Tennessee.

The status of the charcoal furnaces was as follows:

Charcoal Furnaces in Blast.

Location of furnaces.	December 1. Number of stacks.	December 1. No. in blast	December 1. Capacity per week.	November 1. No. in blast.	November 1. Capacity per week.
New England	7	3	248	3	250
New York	3	1	311	2	676
Pennsylvania	5	3	130	2	90
Maryland	1	0	0	0	0
Virginia	3	2	104	2	98
Ohio	8	4	152	4	226
Kentucky	3	0	0	0	0
Tennessee	1	0	0	0	0
Georgia	4	3	893	3	882
Alabama	5	5	1,639	5	1,778
Michigan, Missouri and Wisconsin	10	8	3,387	8	3,199
Texas	4	0	0	1	150
Washington	1	1	100	1	100
Totals	55	30	6,964	31	7,449

Stocks.

The position of furnace stocks, sold and unsold, as reported to us, was as below on December 1, as compared with the five preceding months, the same furnaces being represented as in former months. This does not include the holdings of the steel works producing their own iron:

Stocks.	July 1.	Aug. 1.	Sept. 1.	Oct. 1.	Nov. 1.	Dec. 1.
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Charcoal	13,725	13,071	15,873	13,250	9,597	8,689
Totals	75,037	77,130	79,539	75,901	71,858	94,295

It is understood that the accumulation of stock at some of the coke furnaces is due to the inability to secure cars for shipment.

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The structural material for an iron plant at Gadsden, Ala., has been placed abroad.

OBITUARY.

CHARLES B. HOUSTON.

Charles B. Houston, senior partner in the firm of C. B. Houston & Co., died in the German Hospital, Philadelphia, on November 28, from injuries sustained in being struck by a car at the coal mines at Elkhorn, W. Va., on October 25. Mr. Houston was born near Belfast, Ireland, December 16, 1832, and was brought to America by his parents while a child. He grew to manhood on his father's farm in Lancaster County, Pa., receiving his education in the local public schools and at the State Normal School in Millersville. He abandoned the farm soon after leaving school, formed a partnership with his cousin, Samuel J. Boone, and engaged in general merchandising at Gap, Lancaster County. This firm continued in business until 1863. In 1869 Mr. Houston entered the service of the Pennsylvania Railroad Company as freight agent at Christiana. This position he held for ten years and then resigned it to join his brother, Thomas J. Houston, in the erection of iron works at Greensboro, N. C., for a company of Philadelphia capitalists. After a year and a half he returned to Pennsylvania and entered the employment of McCormick & Co. at Harrisburg. Mr. Houston remained with them until 1874, at which time he formed a partnership with John Roach, the famous shipbuilder, now deceased, and built the Chester Rolling Mills at Chester. The company operated the works for a period of 16 years, during which the business rapidly grew, and at the end of that time sold the plant to the Wellman Steel & Iron Company. The works are now operated by the Tidewater Steel Company. After disposing of his interest in the Chester Rolling Mills Mr. Houston spent the next 18 months in looking after his large iron and coal interests in Virginia and West Virginia. In 1892, in connection with his son, Howard H. Houston, the present Mayor of Chester, and J. Max Bernard, he engaged in the iron, coal and coke business in the city of Philadelphia under the firm name of C. B. Houston & Co., building up a large trade. In addition to his business interests in Philadelphia Mr. Houston was closely identified with many industrial enterprises in other parts of the country. He was director in the Chester National Bank and of the Delaware River Iron Shipbuilding & Engine Works of Chester, Pa. He also was similarly connected with the Crozer Steel & Iron Company of Roanoke, Va.; the Edith Iron & Mining Company, Virginia; the Twelve Pole Coal & Lumber Company of West Virginia, the Roanoke Coal & Lumber Company of the same State and the Mate Creek Coal & Lumber Company of West Virginia. With members of his family he was also half owner of the Houston Coal & Coke Company's property and business at Elkhorn, Va. He was also prominently connected with Masonry, being a Knight Templar.

JOSEPH M. WILSON.

Joseph M. Wilson, the well-known engineer and architect, died suddenly on November 25 in his office in Philadelphia from heart disease, aged 64 years. He was born in Phœnixville, Pa., and was graduated from the Rensselaer Polytechnic Institute, Troy, N. Y. In 1860 he was appointed assistant engineer of the Pennsylvania Railroad, and was connected with that road in important engineering capacities until 1886. In 1889 he made a special examination of the trade and training schools in England and France before designing the Drexel Institute in Philadelphia. Mr. Wilson, as a member of the firm of Wilson Brothers & Co., civil engineers, carried out a number of very important public works, including the main exposition building and machinery hall at the Centennial Exposition, the Drexel Building, the Drexel Institute and the Reading Terminal in Philadelphia. He served on several important commissions as an expert, his latest work of this kind being the building of the Philadelphia filtration system. He was president of the Franklin Institute for years, and was a member of the Engineers' Club of this city, the Institution of Civil Engineers of London, the American Society of Civil Engineers, the American Philosophical Society, a fellow of the American Association for the Advancement of Science and a fellow of the American Institute of Architects.

SIR WILLIAM CHANDLER ROBERTS-AUSTEN, K.C.B., D.C.L.

Sir William Chandler Roberts-Austen, the well-known chemist and assayer of the Royal Mint in London, died on November 22, aged 59 years. He entered the Royal School of Mines in London in 1861 with a view of following the profession of a mining engineer, obtaining, however, a position in the Royal Mint, and in 1869 became the assayer to the Mint. Thirteen years later he was appointed Queen's assay-master, and in 1880 he became professor of metallurgy at the Royal School of Mines, a post which he occupied at the time of his death. Sir William Roberts-Austen was the author of "An Introduction to the Study of Metallurgy" and of many scientific papers treating of metals. He also devoted much attention to the study of the properties of iron and steel and particularly to the hardening of steel. His introduction of thermo-couples for the measurement of high temperatures, and the application of a photographic recorder to the couples had their origin in his devotion to this study. Investigations regarding the constitution of alloys followed, the results being embodied in the report to the Alloys Research Committee of the Institution of Mechanical Engineers. Probably his most important contribution to science was that dealing with diffusion in metals, both liquid and solid, his results bringing these mixtures into line with aqueous and other solutions. The posts which he held were many. He was president of the Iron and Steel Institute in the years 1899-1901, general secretary of the British Association for the Advancement of Science, vice-president of the Chemical Society of the Physical Society—of which he was one of the founders—and of the Society of Arts. He served also on the British Executive Council of the Paris Exhibition of 1889, and was chosen vice-president of the International Mining and Metallurgical Congress in Paris, receiving from the President of the French Republic the Cross of Chevalier of the Legion of Honor. In 1893 he was appointed chairman of the Inland Revenue and Customs Laboratories Committee, the result of whose inquiries was the complete reorganization of these analytical laboratories. He was created K.C.B. in the New Year honors list of 1899. The honorary degree of D.C.L. was conferred upon him in 1897 by the University of Durham.

NOTES.

JAMES E. A. GIBBS, inventor of the Wilcox & Gibbs sewing machine and other mechanical devices, died on November 25 at his home at Raphine, Rockbridge County, Va., aged 73 years.

T. J. EDWARDS, general manager of the Williamson Iron Company, Birmingham, Ala., was killed on November 24, by an explosion at the company's furnace. Mr. Edwards was 55 years of age. Four men were injured by the same explosion.

GEORGE H. CROSBY, the inventor of the Crosby steam gauge, died on November 22 at his home in Albion, Maine, aged 70 years. As a young man he engaged in the machinist's trade in Boston, Mass., and while in that city brought out the gauge that bears his name.

W. MCCLURE HAMMOND, a member of the Reese-Hammond Fire Brick Company of Bolivar, Pa., died suddenly last week from heart failure at his home in that town, aged 60 years. He was a veteran of the Civil War.

JOHN EDWARD TOWNSEND, secretary and a director of John Brown & Co., Limited, of the Atlas Works, Sheffield, England, died on November 21.

ALBERT C. BARNEY, who until his recent retirement was a member of the car manufacturing firm of Barney & Smith, Dayton, Ohio, died suddenly on December 6 at Monte Carlo from heart disease.

In November the American Steel & Wire Company exported over 5000 tons of wire and wire nails, the largest shipments being made to South America, 1562 tons going to that part of the world.

November Fluctuations in Iron Stocks.

The following table shows the extent of transactions and the fluctuations in quotations of the stocks of iron and steel companies in the month of November, with the dates on which the highest and lowest prices on each stock were realized:

Cap'l issued.		Sales.	High-Date. est.	Nov.	Low-Date. est.	Nov.
$17,701,500	Am. Bicycle Co., com..	6,600	1½	25	⅞	14
9,294,900	Am. Bicycle Co., pref.	1,750	6	19	4	17
9,500,000	Am. Bicycle Co., bonds.	24,000	46	25	45½	25
41,233,300	Am. Can, com.....	7,000	11	10	9	12
41,233,300	Am. Can, pref.....	9,525	48	3	39	12
29,000,000	Am. Car & F'dry, com.	26,500	35⅞	1	33	12
29,000,000	Am. Car & F'dry, pref.	5,900	93⅝	1	88¼	19
24,100,000	Am. Loco., com.....	40,800	30⅛	1	26	12
25,000,000	Am. Loco., pref.....	8,800	..	..	..	..
45,000,000	Cambria Steel.....	27,000	28¼	3	26¼	12
7,000,000	Cent. Foundry, com...	600	3½	3	2½	19
7,000,000	Cent. Foundry, pref...	500	16½	3	13	12
17,000,000	Colo. Fuel & Iron.....214,500		91	24	77	10
25,000,000	Crucible Steel, com...	15,200	21½	3	18½	15
25,000,000	Crucible Steel, pref...	10,700	85⅝	7	83¼	15
1,975,000	Diamond State Steel..	790	1 11/16	25	1	15
2,368,100	Empire I. & S., com...	150	13¾	5	10	14
2,281,400	Empire I. & S., pref..	350	46	5	40	28
15,000,000	Inter. Pump, com.....	1,625	50½	10	47	24
8,850,000	Inter. Pump, pref....	400	90	5	90	5
11,000,000	International Silver...	100	17	12	17	12
8,396,000	Natl. Enamel, com....	1,800	36½	1	33	19
15,441,800	Natl. Enamel, pref....	150	90	23	84	20
4,449,800	Otis Elevator, com....	1,900	41½	11	38	15
6,350,000	Otis Elevator, pref....	300	..	..	..	..
10,750,000	Pa., new, com., Phila.	250	52	6	50	6
16,500,000	Pa., new, pref., Phila.	900	101	7	99	19
12,500,000	Pressed Steel, com....	23,000	63½	3	56¾	19
12,500,000	Pressed Steel, pref...	3,900	94	3	90	13
10,000,000	Railway Spr., com...	7,900	36⅜	1	33	12
10,000,000	Railway Spr., pref....	7,100	90	3	83	12
27,191,000	Rep. I. & S., com.....	42,500	22	5	18	14
20,306,900	Rep. I. & S., pref.....	19,850	79½	1	74	14
7,500,000	Sloss-Shef. S. & I.,com.	5,500	66	3	60	28
6,700,000	Sloss-Shef. S. & I., pref.	1,900	92½	6	88	25
20,000,000	Tenn. Coal & Iron....	85,000	67	1	54½	12
1,500,000	Tidewater Steel.....	800	5	10	5	10
12,106,000	U. S. C. Pipe, com....	10,000	15¾	5	12½	18
12,106,000	U. S. C. Pipe, pref....	5,200	56	3	45	14
510,361,300	U. S. Steel Co., com..570,000		40¼	1	35⅜	12
508,511,200	U. S. Steel Co., pref..381,500		88½	5	82⅝	25
8,425,000	Vir. Iron & Coal, com.	25,050	36	29	28	12
10,000,000	Vir. I. & C., 5 % bonds.	40,100	70	12	69	12
1,500,000	Warwick I. & S.....	350	6	17	5½	10

PERSONAL.

A. H. Swartz, who has had charge of the steam plants of the Republic Iron & Steel Company, at Youngstown, Ohio, has resigned to accept a position with the Liberty Mfg. Company of Chicago, manufacturers of steam supplies.

J. D. MacKinnon, president and general manager of the MacKinnon Mfg. Company, Bay City, Mich., has retired from business and turned over his interests to the other stockholders of the company, after 35 years' connection with the concern. Mr. MacKinnon, who was one of the founders of the Variety Iron Works, Cleveland, Ohio, went to Bay City in 1867 and founded the boiler manufactory and iron working business now known as the MacKinnon Mfg. Company. H. D. MacKinnon has succeeded him as president and general manager, A. C. MacKinnon being vice-president and general superintendent, and D. P. Lewis secretary and treasurer.

Samuel W. Griffith has been appointed assistant purchasing agent of the Lorain Steel Company, Johnstown, Pa., in succession to George P. Suppes.

F. C. Kidney having resigned as secretary of the Standard Malleable Iron Company of Muskegon, Mich., has been succeeded by W. H. Mann, formerly assistant secretary.

Henry M. Howe, professor of metallurgy at Columbia College, has been elected an honorary member of the British Institution of Mining and Metallurgy.

William Richards, formerly superintendent of the Kensington Works of the American Tin Plate Company, at New Kensington, Pa., has been made manager of the United States Works, at Demmler, and William C. Lloyd, who has been manager of the latter plant, has been transferred to New Kensington. George Crawford, who was formerly superintendent of the United States Works, at Demmler, has resigned to become general superintendent of the new tin plate plant being erected by the McKeesport Tin Plate Company, at McKeesport, Pa.

Wm. R. Yendall, Jr., has recently resigned the position of manager of the Peninsular Stove Company of Chicago.

William H. Shipp has resigned his position as superintendent of the Lloyd Booth foundry of the United Engineering & Foundry Company, Youngstown, Ohio.

Resignation of Philip W. Moen.

WORCESTER, MASS., December 9, 1902.—Philip W. Moen has resigned as second vice-president of the American Steel & Wire Company, and it is expected that the directors will act upon the resignation immediately. With his retirement the name of Moen will disappear from the Washburn & Moen management. It was in 1849 that Philip L. Moen became the partner of Ichabod Washburn, the founder of the great wire business, the firm name being Washburn, Moen & Co. In 1869 the business was incorporated as the Washburn & Moen Mfg. Company, with $1,000,000 capital stock. P. L. Moen was president and treasurer. His only son, P. W. Moen, entered the business after several years of study of the iron and steel manufacture in Sweden, which followed his graduation from Yale University. The young man was made general superintendent and assistant treasurer and held these positions until P. L. Moen's death in 1891, when he became general manager and treasurer, which offices he held until the Washburn & Moen Mfg. Company, with their $4,000,000 capital stock, sold out to the American Steel & Wire Company in 1898. Mr. Moen was made a director and third vice-president of the consolidation, and afterward was promoted to second vice-president. He was manager of the Eastern division of the company's business, which included the Washburn & Moen department. The announcement of Mr. Moen's resignation is received with deep regret all through the great Worcester plant. Mr. Moen has no business plans for the future, and for the present will occupy much of his time with his new and very fine country place, Ard-na-Clachan, in Shrewsbury, Mass.

The United States Steel Corporation Inspection.—PITTSBURGH, PA., December 10, 1902.—(*By Telegraph.*)—The officials of the United States Steel Corporation, who will make the annual inspection of their plants in the Pittsburgh district and further West, arrived in Pittsburgh this morning. The party includes Elbert H. Gary, chairman of the Executive Committee; Geo. W. H. Perkins, chairman of the Finance Committee; Veryl Preston, third vice-president; W. T. Graham, president American Tin Plate Company; W. P. Palmer, president American Steel & Wire Company; Geo. G. McMurtry, president American Sheet Steel Company; Alfred J. Major, president American Bridge Company of New Jersey, and some of the other executive officers of the company. W. E. Corey, president of the Carnegie Company, the National Steel Company and the American Steel Hoop Company; his assistant, Homer J. Lindsay; Wm. B. Schiller, president of the National Tube Company, and members of the Boards of Directors of these companies, with headquarters in Pittsburgh, will join the party in Pittsburgh. Wednesday is being spent inspecting the Homestead Steel Works, Duquesne Steel Works and Edgar Thomson Steel Works. The party will likely spend two or three days in Pittsburgh and then proceed West.

Ernest L. Brown, Boston, Mass., New England agent for the American Pressed Steel Company, Pittsburgh Chain Company and the Columbia Bridge Company shafting department, has moved into his new offices in the Board of Trade Building.

The Iron and Metal Trades.

Our monthly blast furnace report reflects the peculiar conditions which affect the local branch of the industry. A very considerable number of furnaces have started, chiefly in the districts affected by the Anthracite Coal strike, but the November product was not up to the normal, because of the continued trouble with the Coke supply. Our Coke and Anthracite Iron capacity is now up to 336,617 tons per week, an increase of about 6500 tons per week over last month. There is little doubt that if the furnaces had a chance to run full those now in operation could make close to 350,000 tons per week, which would be above the record.

As it is, the Steel works notably are short of metal, and it appears that some of the larger plants east of the Alleghany Mountains have purchased round lots of foreign Bessemer Pig for early delivery at about $20.25, ex-ship, duty paid. There has also been purchased quite a fair tonnage of low phosphorus Pig. On the other hand, importers of Foundry Iron have done very little in European markets lately, and are holding off, the result being a further weakening of values. Thus Middlesbrough No. 3 can now be sold at a profit, in cargo lots, at $17.75 cash.

In the domestic market the feature of interest is the resumption of negotiations between the leading interest and the Bessemer Association, which have not, however, led to anything as yet. Some moderate lots of Bessemer Pig have sold at Pittsburgh, and a good tonnage of Basic Pig has been placed with Eastern consumers. In Foundry Iron, Chicago notes a shortage of Malleable for prompt delivery, but on the whole the markets are quiet.

The selling of foreign Billets has been resumed, and we can report transactions in 1000 and 2000 ton lots, chiefly for Atlantic Coast delivery, aggregating about 10,000 to 12,000 tons. It is worthy of note that the German steel works are engaged in negotiations to place the export sales of Steel in the hands of their syndicate which makes the sales of Steel for the domestic market. This has already strengthened the market, and to-day the lowest figure named for German Steel Billets, ex-ship, duty paid, is $26.75 to $27.

The Rail mills have now accumulated orders for next year to the extent of 1,800,000 tons, to which must be added the amount of orders which will be carried over from this year, a quantity on which estimates vary. Importers are in receipt of some round inquiries, both for domestic and Canadian account.

The Structural mills continue to receive good orders, among those recently placed being 12,000 tons for a bank building in Chicago. The Plate trade is congested with work. A meeting of the manufacturers is to be held in this city, at which the percentages of participation for next year will be discussed.

Very good accounts are being received of the Sheet trade, and the Bar mills seem to be doing well. The Sheet trade, however, is still in a rather poor condition and prices are suffering.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Dec. 10, 1902.	Dec. 3, 1902.	Nov. 12, 1902.	Dec. 11, 1901.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	$23.00	$23.00	$23.00	$15.50
Foundry Pig No. 2, Southern, Cincinnati	*22.25*	22.75	22.75	14.25
Foundry Pig No. 2, Local, Chicago	23.00	23.00	23.00	15.50
Bessemer Pig, Pittsburgh	**22.00**	21.75	21.50	16.25
Gray Forge, Pittsburgh	*20.75*	20.50	21.50	15.00
Lake Superior Charcoal, Chicago.	*25.00*	26.00	26.00	18.00
BILLETS, RAILS, ETC.:				
Steel Billets, Pittsburgh	**29.50**	29.00	28.50	28.00
Steel Billets, Philadelphia	**27.50*	**26.75*	**27.50*	29.00
Steel Billets, Chicago	**29.50*	**29.50*	**29.00*	....
Wire Rods, Pittsburgh	*34.50*	34.50	35.00	34.50
Steel Rails, Heavy, Eastern Mill.	28.00	28.00	28.00	28.00
OLD MATERIAL:				
O. Steel Rails, Chicago	18.75	18.75	18.75	14.00
O. Steel Rails, Philadelphia	21.00	21.00	21.00	17.75
O. Iron Rails, Chicago	*24.00*	24.50	24.50	21.00
O. Iron Rails, Philadelphia	*23.50*	24.00	24.50	21.50
O. Car Wheels, Chicago	24.00	24.00	24.00	15.50
O. Car Wheels, Philadelphia	*20.00*	20.00	21.00	16.75
Heavy Steel Scrap, Pittsburgh	21.00	21.00	21.00	....
Heavy Steel Scrap, Chicago	*18.25*	18.50	18.50	13.50
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia.	1.92½	1.92½	1.85	1.65
Common Iron Bars, Chicago	*1.75*	1.75	1.80	1.65
Common Iron Bars, Pittsburgh	*1.70*	1.70	1.80	1.55
Steel Bars, Tidewater	1.75	1.75	1.72	1.70
Steel Bars, Pittsburgh	1.60	1.60	1.60	1.50
Tank Plates, Tidewater	2.10	2.10	2.10	1.75
Tank Plates, Pittsburgh	1.85	1.85	1.85	1.60
Beams, Tidewater	2.00	2.00	2.00	1.75
Beams, Pittsburgh	*2.00*	2.00	2.10	1.60
Angles, Tidewater	2.00	2.00	2.00	1.75
Angles, Pittsburgh	*1.95*	1.95	2.00	1.60
Skelp, Grooved Iron, Pittsburgh	*1.90*	1.92½	1.95	1.72½
Skelp, Sheared Iron, Pittsburgh	*2.00*	2.05	2.05	1.80
Sheets, No. 27, Pittsburgh	2.65	2.65	2.65	2.90
Barb Wire, f.o.b. Pittsburgh	2.45	2.45	2.45	2.90
Wire Nails, f.o.b. Pittsburgh	1.85	1.85	1.85	2.00
Cut Nails, Mill	2.05	2.05	2.05	2.05
METALS:				
Copper, New York	**11.65**	11.50	11.50	16.50
Spelter, St. Louis	*4.60*	4.82½	5.15	4.17½
Lead, New York	4.10	4.10	4.10	4.37½
Lead, St. Louis	*3.97½*	3.97½	4.00	4.25
Tin, New York	*24.85*	24.75	26.20	25.25
Antimony, Hallett, New York	*7.12½*	7.25	7.25	8.37½
Nickel, New York	40.00	40.00	40.00	60.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York	3.79	3.79	3.79	4.19

* Foreign.

Chicago.

FISHER BUILDING, December 10, 1902.—(*By Telegraph.*)

Most Coke Foundry grades of Pig Iron have found a still lower level during the week, but the adjustment was necessary to wipe out the sharp line of demarcation between Iron for quick shipment and for delivery during the next few months. The result is a much steadier market, the decline which has come with so little flurry indicating the inherent strength of the situation. It is notable that Malleable foundries are finding the same difficulty in obtaining Iron for immediate consumption as they did a year ago, when they were buying largely of Charcoal grades, but this year the Charcoal grades are as scarce as Malleable Iron. It is interesting to observe that a considerable tonnage of Steel Rails which could not be cared for by Western mills has been placed with Eastern mills during the week. It is significant that the demand for Light Rails from mines and electric railways continues as urgent as ever. One of the features of the week, too, has been the freer buying of Structural Material which has followed the less crowded condition of the mills. There has been further buying of foreign material, although only in moderate amounts, including Billets, Structural Material and Malleable Pig Iron. A point of interest, too, has been the sales of Merchant Pipe, one contract of a considerable amount being placed for consumption at the St. Louis Fair Buildings and another contract of some magnitude to be placed by a gas company is now pending. Old Material continues to yield to a considerable extent, and Coke is steadily developing an easier feeling, lower prices being anticipated from the increased production which is expected to enter the market within a few months.

Pig Iron.—One of the most prominent features of the market has been the urgent demand for Iron from Malleable foundries for quick delivery. Most of these consumers are largely covered by contracts, but promises do not bring the Iron, and while deliveries have improved it is very difficult to obtain Iron which can be used by these foundries in adequate amount. The little Standard or Malleable Bessemer available is quickly taken, and Charcoal Iron, whenever offered, is quickly absorbed for the same purposes, but as a rule there is no surplus of Charcoal grades, Car Wheel manufacturers leaving little of this kind of Iron for other melters. During the week several thousand tons of foreign Malleable have been received, and further purchases have been cabled during the past few days. Sales, too, of both Malleable and Standard domestic Bessemer have been made during the week at $25.10 to $25.50, delivered Chicago, but more is wanted than is now available. It is understood that there is some little increase in the offerings of Charcoal Iron for early next year's delivery, but spot Iron of this character is very scarce and commands a premium. Most of the Iron sold during the past week has been of Foundry grades, largely of Southern production and mainly of Nos. 1 and 2 Foundry and No. 2 Soft on a little lower basis, in some instances $19, Birmingham, being accepted for No. 2 Foundry. Sales have also been made on the basis of $20, Birmingham, for No. 2 Foundry for December and January delivery. In the aggregate between 8000 and 10,000 tons has been sold. There has continued to be some little trading for next year, but prices are gradually yielding, in sympathy with early delivery Iron, sales having been made on the basis of $19 to $20 for No. 2 Foundry, Birmingham, for delivery during the first and second quarter, and in one instance running into the third quarter of 1903, but the tonnage of these transactions has been relatively small, buyers' wants being largely confined to December and the early months of next year. It is anticipated that larger buyers will find it advantageous to cover contracts early in January. Now that a lower level has been reached and prices adjusted a steadier future market is anticipated. Local Iron for quick delivery is still scarce, but one contract of upward of 1000 tons was placed during the week on the basis of $23.30 for No. 2, Chicago, for delivery during the first quarter of next year. Almost any kind of Iron which is on track or actually in transit commands a premium over shipments to be made in the future, and Iron of this character has been sold during the week in several hundred ton lots at prices ranging from $25.65 to $26.15 for No. 2 Foundry. Silicon Iron is still scarce, and held at very high prices, both for early and late shipment. Southern Charcoal Softeners are unavailable to any appreciable extent, and prices are entirely nominal. It is worthy of note that there is less worry about fuel supply, and, especially by those who understand the situation thoroughly, much lower prices are anticipated in the near future. There is or will be more competition among the independent owners than for many years. The advent of real winter weather accompanied by the usual storms adds another element of uncertainty to temporarily obtaining both Iron and fuel. The Southern furnaces still find difficulty in obtaining cars for shipment, and there is some accumulation in furnace yards, but it is not likely that there is less anxiety on this score. Lower level of domestic Pig has brought a reaction in foreign markets, and there is some pressure from abroad to secure American orders at lower prices. As the bulk of the business now being transacted is for early delivery Iron—sales for the second quarter and later deliveries being in the minority—the following table has been adjusted to conform to the prices current for early shipments, say December and January, which is practically now spot Iron. The following are the prices current for Iron to be shipped in December and January next:

Lake Superior Charcoal	$25.00 to $26.00
Local Coke Foundry, No. 1	23.50 to 24.00
Local Coke Foundry, No. 2	23.00 to 23.50
Local Coke Foundry, No. 3	22.50 to 23.00
Local Scotch, No. 1	24.00 to 24.50
Ohio Strong Softeners, No. 1	27.50 to 28.00
Southern Silvery, according to Silicon	26.15 to 29.15
Southern Coke, No. 1	23.65 to 24.15
Southern Coke, No. 2	23.15 to 23.65
Southern Coke, No. 3	22.65 to 23.15
Southern Coke, No. 1 Soft	23.65 to 24.15
Southern Coke, No. 2 Soft	23.15 to 23.65
Foundry Forge	22.15 to 22.65
Southern Gray Forge	19.15 to 19.65
Southern Mottled	19.15 to 19.65
Southern Charcoal Softeners, according to Silicon	27.15 to 27.65
Alabama and Georgia Car Wheel	29.15 to 29.65
Malleable Bessemer	25.00 to 25.50
Standard Bessemer	25.00 to 25.50
Jackson County and Kentucky Silvery, 6 to 8 per cent. Silicon	31.00 to 32.00

Bars.—There has been a lack of animation in the market for both Bar Iron and Soft Steel Bars, there being but little new business and only moderate specifying on previous contracts. Hoops and Bands have also continued quiet. The following are the prices current: Bar Iron, 1.75c. to 1.80c.; Soft Steel Bars, 1.75c. to 1.80c.; Hoops, 2.15c. to 2.25c.; Angles, 1.85c. to 1.90c., base, mill shipment. But few orders have been received by merchants and prices have remained nominally unchanged: Bar Iron selling at 2.15c.; Soft Steel Bars, 2c. to 2.25c.; Angles at 2.50c., and Hoops at 2.40c., base, from store.

Structural Material.—There has been an improved demand throughout the week, sales aggregating about 10,000 tons, mostly for delivery during the next four months. Among the contracts was one for 1500 tons for the Polk Building and one for 500 tons for a malt house. There has continued to be a fair inquiry for foreign material, with sales of 400 to 500 tons of Beams and Angles and smaller lots for distribution from warehouses where foreign material has been accumulated. For domestic Steel shipments prices are as follows: Beams, Channels and Zees, 15 inches and under, 1.75c. to 1.90c.; 18 inches and over, 1.85c. to 2c.; Angles, 1.75c. to 1.90c. rates; Tees, 1.80c. to 1.90c.; Universal Plates, 2c. to 2.25c. The demand from local stocks has been only moderate and a little easier tone has prevailed for Angles and Tees, which have been reduced, but Beams and Channels are well sustained. The following are the prices current from local stocks: Beams and Channels, cut to length, 2.50c. to 3c.; Angles, 2.25c. to 2.50c.; Tees, 2.30c. to 2.55c., at local yards.

Plates.—The market has continued strong, with some business of moment still pending, but sales during the week have been small. The following are the prices current: Tank Steel, ¼-inch and heavier, 1.75c. to 2.10c.; Flange, 1.85c. to 2.10c.; Marine, 1.95c. to 2.20c. There has been only a moderate inquiry for small lots from local yards, but prices have remained steady, as follows: Tank Steel, ¼-inch and heavier, 2.25c. to 2.50c.; Tank Steel, 3-16-inch and No. 8, 2.30c. to 2.50c.; Flange, 2.50c. to 2.65c., all f.o.b. warehouse, Chicago.

Sheets.—But little, if any, improvement has been noted in this market, the volume of business being only moderate and keen competition still resulting in irregular prices. The following are the official prices for Black Sheets, mill shipment, carload lots, f.o.b. Chicago: No. 20, 2.55c. to 2.60c.; Nos. 22 and 24, 2.60c. to 2.70c.; No. 26, 2.70c. to 2.80c.; No. 27, 2.80c. to 2.90c.; No 28, 2.90c to 3c. Galvanized Sheets have continued slow and easy, with a discount of 75 and 10 on the base price allowed. The following are the net prices: No 27, 3.25c. to 3.50c. for mill shipment, and small lots from store at 3.40c. to 3.65c., Chicago.

Cast Pipe.—The market has been quiet and a little easier in tone, but no pressure to sell. Manufacturers in selling small lots ask the following prices: 4-inch, $36.50 to $37; 6-inch, $35.50 to $36; 8-inch and upward, $34.50 to $35; Gas Pipe, $1 per ton higher, f.o.b. Chicago.

Billets.—The demand for foreign Billets has continued active, with sales of two lots of 2000 and two lots of 1000 tons each being placed by a Chicago interest for delivery on the Atlantic seaboard on the basis of previous quotations. Sales of 1400 tons of special Billets have been made for early shipment at prices ranging between $29.50 and $30, delivered Chicago. There has been a fair inquiry for domestic Billets, but sales have been confined largely to small lots ranging from car lots to 200 tons for early delivery at prices ranging for Open Hearth from $36 to $40, according to analysis, buyer and time of delivery. Rerolling Billets are nominally quotable at $31 to $32, mill shipment, Chicago. For small lots the usual premium is asked and obtained.

Merchant Pipe.—One or two large contracts have been placed during the week, aggregating about 1200 tons, and there have also been a number of orders of this character during the past 30 days, which runs up the aggregate tonnage considerably, but the merchant trade, confined to small lots, has been quiet. Among the recent sales have been one contract for 20,000 feet of Ammonia Pipe for a refrigerating plant. One contract for 1000 tons for delivery from January to April, 1903, is pending. The jobbing trade, however, has been quiet, consumers anticipating lower prices from the competition which the independent mills continue. The following are the official consumers' prices current, base, net, random lengths, for mill shipment, f.o.b. Chicago, carloads only:

	Steel Pipe.		Guaranteed Wrought Iron.	
	Black.	Galvd.	Black.	Galvd.
	Per cent.	Per cent.	Per cent.	Per cent.
⅛ to ⅜ inch	66½	56½	63½	53½
½ inch	68½	58½	65½	55½
¾ to 6 inches	73½	63½	70½	60½
7 to 12 inches	71½	61½	68½	58½

Boiler Tubes.—The market has been quiet and easy, but prices have been without essential change. The following table of discounts is subject to an additional discount of 5 per cent. for mill shipment:

	Steel.	Iron.
1 to 1¼ inches	43½	38
1¾ to 2½ inches	56	36
2¾ to 5 inches	61	46
6 inches and larger	56	36

There has been more active competition for small lots for

shipment from store, an additional discount of 5 per cent. being granted to those given in the following schedule:

1 to 1½ inches	35	35
1¾ to 2½ inches	47½	32½
2¾ to 5 inches	55	42½
6 inches and larger	47½	..

Merchant Steel.—There has been a fair demand, with several hundred tons of Machinery, Tire and Spring Steel placed for delivery during the first quarter of 1903. There has been no special activity in Crucible Tool Steel, but more competition has been noted in the ordinary grades, resulting in some cases in a slight shading of prices. For mill shipment prices are as follows: Smooth Finished Machinery Steel, 2c. to 2.10c.; Smooth Finished Tire, 1.95c. to 2.10c.; Open Hearth Spring Steel, 2.65c. to 2.75c.; Toe Calk, 2.25c. to 2.40c.; Sleigh Shoe, 1.85c. to 1.90c.; Cutter Shoe, 2.40c. to 2.60c.; Cold Rolled Shafting, 47 off in carload lots and 42 off in less than car lots. Ordinary grades of Crucible Tool Steel are quoted at 6c. to 7c. for mill shipment; specials, 12c. upward.

Rails and Track Supplies.—Sales in the local market during the week have been confined to small lots ranging from 1000 to 2500 tons, aggregating about 5000 tons for various deliveries in 1903. The Western mills being so closely sold for almost the entire year orders have been turned East for Western delivery, about 30,000 tons having been placed with the Eastern mills during the week. There has also been an active demand for Light Rails, one lot of 1000 tons 60 lbs. having been placed. All the second quality available find ready sale at $1 per ton under the price of standards, some moderate sales having been made during the past few days on this basis. Electric roads and mines are the largest buyers in this market at present, but are unable to obtain the weight desired and in some instances requirements have been covered with Relaying Rails on the basis of $32.50, Chicago. Official prices for domestic Rails continue unchanged at $28 for standard and $27 for second quality, mill shipment. Light Rails range from $35 to $45, according to weight. Track Supplies have continued active and strong at the following prices: Splice Bars or Angle Bars, 2c.; Spikes, 2.50c.; Track Bolts, with Hexagon Nuts, 3.10c. to 3.45c.; Square Nuts, 2.95c. to 3.10c.

Old Material.—The offerings are but little, if any, increased, but with buyers holding off or bidding lower prices the market has developed a weaker tone. There is still a great scarcity of Relaying Rails, and Old Car Wheels are wanted at full prices, but prices are little better than nominal in absence of trading in any appreciable quantities. The following are the prices per gross ton, Chicago:

Old Iron Rails	to $24.00
Old Steel Rails, mixed lengths	$18.75 to 19.00
Old Steel Rails, long lengths	23.50 to 24.50
Heavy Relaying Rails	32.00 to 32.50
Old Car Wheels	24.00 to 25.00
Heavy Melting Steel Scrap	18.25 to 18.50
Mixed Steel	15.50 to 16.00

The following quotations are per net ton:

Iron Fish Plates	to $22.00
Iron Car Axles	$24.50 to 25.00
Steel Car Axles	23.50 to 24.00
No. 1 Railroad Wrought	19.50 to 20.00
No. 2 Railroad Wrought	17.50 to 18.00
Shafting	20.00 to 21.00
No. 1 Dealers' Forge	16.00 to 16.50
No. 1 Busheling and Wrought Pipe	14.00 to 14.50
Iron Axle Turnings	to 15.00
Soft Steel Axle Turnings	14.50 to 14.75
Machine Shop Turnings	13.50 to 14.00
Cast Borings	10.00 to 10.25
Mixed Borings, &c.	10.50 to 11.50
No. 1 Boilers, cut	14.50 to 15.00
Heavy Cast Scrap	17.50 to 18.00
Stove Plate and Light Cast Scrap	14.00 to 14.50
Railroad Malleable	16.25 to 16.50
Agricultural Malleable	15.75 to 16.00

Metals.—The local Copper market has recovered somewhat in sympathy with primary markets, but there has been but little activity. Lake is now quoted at 11½c. in carload lots, and 11¾c. to 12c. in a jobbing way. Pig Lead has continued firm with a good demand at 4.05c. in 50-ton lots, 4.07½c. in carload lots, and 4.10c. in a jobbing way. Sheet Zinc has been a little firmer, but closed steady at 6¼c. in less than carload lots. Old Metals have been quiet, but prices have not changed essentially. Sales have been made by local dealers in a moderate way at the following prices: Heavy Cut Copper, 10¼c.; Red Brass, 10¼c.; Copper Bottoms, 9¼c.; Lead Pipe, 3.90c.; Zinc, 3.80c.

Coke.—As the situation is better understood an easier tone is developing in the market for both Foundry and Furnace Coke. There is less urgent demand for spot, but the offerings on track are only moderate and prices have continued mainly at $10 for Foundry Coke, but Furnace Coke to arrive is obtainable at $1 per ton less. For contracts covering the first half of next year ovens are asking $3.75 to $4 for Furnace and $4.25 to $4.75 for Foundry Coke. A number of furnaces, however, are still holding off from placing contracts, anticipating lower prices from the fact that there are now under construction upward of 8000 to 10,000 ovens. It is also known that the product from 3000 to 4000 ovens, which has heretofore been sold under the Frick name, is now available for the open market, and these ovens being controlled by numerous independent operators, it is anticipated that increased competition will result in bringing prices more nearly to a normal limit as the increased supply becomes available from the new ovens.

A. M. Crane & Co., Incorporated, Chicago and New York, announce that they have just taken the agency of the Muskingum Valley Sheet Company, owned by Goff, Horner & Co., Limited, of Pittsburgh. The Muskingum Valley Sheet Company have a capacity of about 1500 tons per month of Sheets of various kinds, gauged from 14 to 30, inclusive. They manufacture one-pass cold rolled, box annealed, pickled and cold rolled, three-pass cold rolled and the Muskingum Electrical Sheets; they also make a full line of Corrugated and V Crimped Roofing and Siding, Pressed Brick Siding and Pressed Standing Seam.

The accounting and general offices of the Inland Steel Company have been removed from Chicago to Indiana Harbor, where the works are located, and have been in active operation for several months. Sales and private offices, however, will be retained in the Marquette Building, Chicago.

Philadelphia.

FORREST BUILDING, December 9, 1902.

All the indications point to the fact that business is entering upon holiday conditions. Interest in the market seems to have died out, except for such quantities as may be required to complete the year with. This naturally leads to an easier feeling, and there is some apprehension that the next five or six weeks may develop conditions that would not be entirely welcome. There can be no doubt that at the present time prices along the entire line are soft and yielding, some more, some less, but almost anything can be bought at less money than could have been done a month ago, and the chances for permanent recovery are not particularly good. The car and Coke shortage may tie things up again, and as there is a prospect of bad weather, freight movements may cause renewed scarcity of material, but these are not evidences of improvement, although they may stiffen prices temporarily. It may also be noted that shipments of Iron from Europe are likely to be held up by the closing of inland water transportation. Some large lots of Pig Iron have been bought for shipment to the United States, but contracts are subject to water communication being maintained, and as cable reports say that intense cold prevails in Europe, the situation as regards Iron shipments is somewhat critical. At the moment, however, it is less difficult to get spot Iron than it has been for months past. Quite a good deal of foreign Iron is in port and scheduled to arrive two or three times a week, so that moderate sized lots are easily obtained, either ex-ship or f.o.b. furnaces. Confirmation of this may be found in the fact that prices are not nearly as rigid as they were a month or six weeks ago, $23 to $23.50 being very full prices for American Iron, and $1.50 to $2 to less for English or German Irons. Of course, if heavy buying was to set in, prices would easily work back to high figures, but there is where the uncertainty comes in. Will there be heavy buying and at what figure will it commence? The situation is uncertain from every point of view. The questions of demand, of supply, of price, of imports and of freights, all have to be considered, and for the time being it is impossible to be very sure how any of them will turn out. We have had fine crops, and they are a strong foundation for prosperous conditions, but there is a possibility that they may have been fully discounted, and indeed there are some who fear that such is the case. Imports, unless interfered with by ice or snow blockades, are likely to be very heavy, and in view of the unusually bad trade conditions in Europe, we shall have to take a great deal of foreign material, if prices keep anywhere near to what they are to-day, and in case of continued pressure they could go $2 to $3 lower before they got back to their starting point. It is not altogether impossible that business may assume unexpectedly large proportions, but it is certain that the immediate outlook does not offer much encouragement in that direction. The country has had a lengthened period of extraordinary prosperity, prices have been maintained at nearly 100 per cent. higher than the average of what they were for five or six years ago, foreign Iron is coming in at the rate of nearly 100,000 tons per month, cost sheets have been increased to extraordinary figures, and productive capacity has been almost doubled, so that it will be contrary to all precedent to have another spurt of activity until we have some reaction. This seems a time when people are doing some thinking, and it will not be very long before thought will become manifest in action, but what form it will assume remains to be seen, not immediately, perhaps, but the next activity will give a pretty good idea of the direction prices will take during the first half of the coming year.

Pig Iron.—There is as much uncertainty in regard to the Pig Iron situation as there has ever been. A point has been reached at which even the weather has an important bearing

on the Iron market. To estimate the situation with any reasonable degree of accuracy things have to be considered which at other times have not entered into the matter at all. At present, however, a snow blockade would have far reaching consequences, inasmuch as it would renew the difficulties which it was hoped were at least measurably removed, but which in fact are almost as bad as they were during November, and will be as bad or worse this month if transportation is blocked by bad weather. The margin of safety is so narrow that it takes very little to change conditions from day to day. The tendency of events during the past 10 or 15 days has been to cause an easier feeling in Pig Iron, but the immediate conditions may lead to a reactionary tendency. Coal and Coke has not come forward as freely as expected, and there is a renewal of the feeling that there may be another shortage of Pig Iron, particularly if navigation in Germany is interrupted. A very large tonnage of Pig Iron was bought for shipment to the United States during December and January, but the contracts were subject to open water navigation, so that our markets are not only subject to open weather here, but to some extent to similar conditions in Europe also. With so many contingencies which may or may not become effective, predictions in regard to the Iron market are extremely dangerous. All that can be said, therefore, is that the feeling has been growing easier, supplies of spot Iron a trifle larger, and less firmness in quotations for almost any delivery. Cargo lots of foreign Iron can be done at about $18 or less for Middlesbrough, a trifle over $19.25 for German Foundry brands, $20 to $20.50 for East Coast Bessemer and $22 for Low Phosphorus. These are inside prices for cargo lots on dock, duty paid, cash against bill of lading. A number of cargoes have been taken by large interests, which while not important in themselves are not likely to affect the general market. Ordina y lots, ranging from a few carloads to 1000-ton lots command about the following prices for deliveries in buyers' yards, city or at nearby points:

No. 1 X Foundry	$24.00 to $25.00
No. 2 X Foundry	23.00 to 23.50
No. 2 Plain	22.00 to 22.50
Gray Forge	21.00 to 21.50
Middlesbrough	21.50 to 22.00
Scotch	23.00 to 24.50

Billets.—There is not a great deal of business to report, as the arrivals are likely to be somewhat large during January, and new business is in consequence held in abeyance. Prices for lots of foreign would be about $27.50 to $28 for December, and probably a dollar less for the first quarter of the coming year. American Steel not plentiful, prices nominal at $30.50 to $31.50 for prompt shipments.

Plates.—There is a good demand for Plates, both for prompt and for next year's shipments. The situation is somewhat abnormal, however, owing to the shortage of Coal, mills not being able to make more than a two-thirds output, and even that is precarious, as the railroads are still unable to keep up with shipping requirements. The Plate trade is in better shape than most of the other branches, as a large tonnage is needed as quickly as it can be arranged, and will in any case extend well into the spring months. Prices firm and unchanged as follows: Small lots, 2.10c. to 2.15c.; Carload lots, ¼-inch and thicker, 2c. to 2.05c.; Universals, 2c. to 2.05c.; Flange, 2.10c. to 2.20c.; Fire Box, 2.25c. to 2.30c.; Marine, 2.30c. to 2.35c.

Structural Material.—The demand is not as active as could be desired and some of the mills need orders promptly if they are to be kept on full time. Consumption usually falls off during the winter months, but the shrinkage is a little earlier than usual this year, partly perhaps because of the large imports and partly because of the considerable increase in the productive capacity. The official quotations apply to most of the business when in good sized lots, and a small advance on a few special sizes. Carload lots as minimum quantity as follows: Angles, 1.72c. to 1.75c.; Beams and Channels, 1.72c. to 1.90c., according to specification.

Bars.—Business is very quiet, which however is not unusual at this season. Most of the mills have enough business to carry them through the remainder of the year, but new orders are of rather small volume. Prospects are uncertain, but they are certainly not bright enough to warrant very favorable anticipations as regards the coming month, although some people insist that there will be plenty of business by the time it is needed. Prices, 1.92c. to 1.95c. for Refined Iron and 1.72c. to 1.85c. for Steel.

Sheets.—At a price plenty of business could be had, but manufacturers are inclined to turn it down rather than go below the recent quotations. Small lots are in active demand and are sufficient to keep the mills fairly well employed.

Old Material.—The market is weak and under pressure to sell very low prices would have to be accepted. Some large lots of Steel have been sold, however, and arrivals from abroad are quite heavy. Sales mostly at medium figures between bids and offers, which are as follows, delivered in buyers' yards:

Old Steel Rails	$21.00 to $21.50
Heavy Steel Scrap	20.00 to 21.00
Low Phosphorus Scrap	26.50 to 27.50
Old Steel Axles	25.00 to 26.00
Old Iron Rails	23.50 to 24.50
Old Iron Axles	29.00 to 30.00
Old Car Wheels	20.00 to 21.00
Choice Scrap, R. R. No. 1 Wrought	22.00 to 23.00
Country Scrap	20.00 to 21.00
Machinery Cast	19.50 to 20.00
No. 2 Light Scrap	18.00 to 19.00
No. 2 Light (Ordinary)	14.50 to 15.00
Wrought Turnings	16.00 to 16.50
Wrought Turnings, Choice Heavy	17.00 to 17.50
Cast Borings	10.00 to 10.50
Stove Plate	14.00 to 15.00

Cleveland.

CLEVELAND, OHIO, December 9, 1902.

Iron Ore.—The story of the Iron Ore market for the present year has been told. The last cargoes are now being shipped away from the head of the lakes and will be received at the lower lake ports the latter part of this week or the first part of next, if the usual speed is made by the down bound ships. There has been more or less ice to contend with since the first of December and the shipments have been considerably smaller than during any similar length of time in any of the preceding months of this season.

Pig Iron.—The Coke situation demands more attention just now than it has commanded heretofore, even though it has been the reigning topic for the last three months. The first spell of severe weather settled over this section during the week that has just closed. Snow has fallen generally to a depth of about 2 inches and has been accompanied by increasingly cold weather. From the mild summer weather of ten days ago the change is remarkable. The result has been that the transportation people have been caught unawares and their facilities are inadequate. The Coke ovens have been cut short of cars and the shipments to the furnaces have accordingly been lessened. Several of the furnaces in the Valley, which were able to operate last week, suspended activity Monday morning, but the situation can hardly be said to be very much more serious than at a similar period last year, although the stacks are in a worse plight than they were ten days ago. This increased shortage has not affected the condition of the Pig Iron market so far. In the Foundry grades the stacks seem capable of taking care of their immediate needs. The stocks have been exhausted for a long time and those having contracts are forced occasionally to go on the market and cover their needs when the furnaces with which they have their orders placed are unable to provide the desired amount of material. This keeps up a certain demand for material in small quantities. There is, however, a good, brisk demand for material for January shipment and it seems now as if the buying for that period would be as heavy as during any period for this year. This buoyant spirit in the Pig Iron trade has been marked as one of the hopeful signs of the time. There is no further talk of buying material abroad. The demand for Foundry Iron at home for third quarter delivery of 1903 is just beginning to take form in this territory. A little of it has been done all along, but as a general movement it is just now beginning to develop. The foundries in this territory have made numerous inquiries of late, but have placed no large orders so far. The prices hold steady at $23 for No. 2, for first half delivery, Valley furnace; $20 for No. 2 Southern Iron, Birmingham, and $21 for third quarter delivery, Northern No. 2, Valley furnace. The Bessemer and Basic producers are still off of the market, making no quotations until deliveries on present contracts have been completed.

Finished Iron and Steel.—The demand for Plates has been the strongest feature of the market during the week. The mills of the Steel Corporation and their larger competitors are well filled with orders, and in the main the specifications have been satisfactory. The smaller mills present one of the strong sides of the market. The consumers, of course, do not desire to pay premiums for material unless compelled to do so, and are ordering material at premium prices only when it cannot be obtained elsewhere. This week a few contracts have been placed at 2c. at the mill, which equals a premium of $9.20 a ton delivered at Cleveland. These contracts run through the first half. The jobbers have disposed of all of their material at 2.25c. for Sheared and 2.50c. for Universal Mill Plates. The big mills are still getting 1.60c., Pittsburgh. The Sheet demand is about as it has been. There is still a lack of specifications on old orders, and likewise an absence of any new ones of sufficient size to keep the mills going. There have been some temporary suspensions of activity on the part of the mills in this territory waiting either for specifications or orders. The Sheet prices seem to have continued their downward tendency, but without any serious break so far, hence the quotations are continued: No. 27, as a basis, out of stock, 3.10c. to 3.25c. and 2.85c. to 2.95c. at the mill in carload lots. The price of Galvanized Sheets remains firm at 3.70c. to 3.85c. for No. 27 as a base. The demand for

Structural Steel has not been so strong, which is the natural condition at this time of the year when building operations are the least active. There is a good deal of buying, however, for future delivery, although it has not been as brisk of late as formerly. In a good many ways also it is easier to obtain deliveries on old contracts. While this is the case there are no evidences of organic weakness in the market, and a business fully as good as developed in February last year is expected to start up during the coming spring. Just now some of the smaller mills want orders, and are receding from their premium policy in order to obtain what business is in sight. Many of the mills which had asked 2.50c. at the mill for their material are now taking 2c. as a maximum, and in some instances the price for quick shipment has been made as low as 1.75c. at the mill on choice specifications. Some sales are made with deliveries promised inside of two weeks. The jobbers have sold all of the material which they had on contract prior to January 1, and most of it has been ordered out. The buyers are left, therefore, with only the small mills to draw from. In some instances the mills are taking this opportunity between slack seasons to make some necessary repairs. The price asked by the larger mills is still 1.60c., Pittsburgh, while the jobbers are getting from 2.50c. to 3c. The Bar Iron market is still weak, and the readjustment of prices seems inclined to go still further. The producers recognize the futility of trying to market this material with Bessemer Steel Bars obtaining the price at which they are now quoted. This one thing is evidently preventing a large business being done. The mill men realize that the new business will start probably on a lower basis, and have been trying to beat down the price of Scrap. The indications are that there is an enormous business ahead. The stocks have been exhausted for some time and the buying now is to cover immediate needs. The price at which most of the Bar Iron is now sold is 1.70c., Pittsburgh or Youngstown, with the understanding that in some cases this price is shaded. The Bar Steel trade is strong, especially in the Open Hearth grade. The Light Bars are rather easy to obtain and the Bessemer Billet supply being rather plentiful seems to limit the amount of Bessemer Steel Bars now being sold. The Bar prices hold firm at 1.60c., Pittsburgh, for Bessemer and 1.70c., Pittsburgh, for Open Hearth. There is a fair call for Billets, but with no large transactions noted during the week. The price holds firm at about $30, Pittsburgh, for Bessemer.

Old Material.—The market seems to be rather quiet, with a downward tendency of prices, and with the mills inclined to refuse old contracts in the hope of making new ones which are more advantageous as to price. The quotations this week are revised as follows: No. 1 Wrought, $19, net; Iron Rails, $25.50, gross; Iron Axles, $28, net; Cast Borings, $12, gross; Wrought Turnings, $16.50, gross; Cast Scrap, $19, net; Car Wheels, $22.50, gross; Heavy Melting Steel, $19, gross; Old Steel Rails, $20, gross.

St. Louis.

CHEMICAL BUILDING, December 10, 1902.—(*By Telegraph.*)

Pig Iron.—Conditions rule steady in the Pig Iron market, and while spot Iron has been coming more freely to this point the past few weeks, prices have been well maintained in the face of this fact. Buyers are not generally committing themselves for actual requirements beyond the first half of the year, apparently preferring to be in position to take advantage of more favorable conditions. As the first of the year approaches prices assume a more normal condition and general quotations are on a basis of $19.50 to $21, Birmingham, for No. 2 Foundry for present and far off delivery. Contract Iron is coming forward with more freedom and this will account in large extent for the lesser activity and snap for spot material. We quote f.o.b. St. Louis:

Southern, No. 1 Foundry	$24.25 to $25.75
Southern, No. 2 Foundry	23.25 to 24.75
Southern, No. 3 Foundry	22.75 to 24.25
Southern, No. 4 Foundry	22.25 to 23.75
No. 1 Soft	24.25 to 25.75
No. 2 Soft	23.25 to 24.75
Gray Forge	22.25 to 23.75
Southern Car Wheel	..... to .....
Malleable Bessemer	..... to .....
Ohio Silvery, 8 per cent. Silicon	..... to .....
Ohio Strong Softeners, No. 1	..... to .....
Ohio Strong Softeners, No. 2	..... to .....

Bars.—The movement of Iron and Steel Bars through the jobbing trade at this time, while not large, is nevertheless in good volume and well up to the usual demand for this season of the year. Prices are well maintained. We quote from the mills: Iron Bars at 1.85c. to 1.95c.; Steel Bars at 1.80c. to 1.90c. Jobbers quote Iron Bars at 2.25c. and Steel Bars at 2.25c., from store in small lots, but we hear of 2.15c. in larger quantities.

Rails and Track Supplies.—Business cannot wane in this department of the market while so many improvements and enlargements are under way and contemplated by the railroads. The call from many directions is urgent and it is very often that business has to be turned down on account of inability to meet the requirements of delivery. We quote as follows: Splice Bars, 2.10c.; Bolts, with Hexagon Nuts, 3.25c. to 3.30c.; with Square Nuts, 3c. to 3.10c.; Spikes, 2.60c. to 2.75c.

Angles and Channels.—The amount of new inquiry and demand for Small Angles and Channels is not on a large scale and jobbers report a satisfactory volume of them for this season of the year. For materials of this class 2.50c., base, is asked.

Pig Lead.—The market for Pig Lead continues steady and firm, with quotation for Chemical at 3.97½c. to 4c., and Desilverized at 4c.

Spelter.—The market has steadied up after the recent decline, which has been quite a severe one. Transactions are not of an unusual order at this time and the price movement ranges from 4.60c. to 4.70c.

Birmingham.

BIRMINGHAM, ALA., December 8, 1902.

The near approach of the holidays would naturally incline one to anticipate an easing up in the Iron market. There has been some easing up, but reflected more in the deferred deliveries than in the spot and nearby deliveries. The latter continue to keep up pretty well, while there is somewhat of a sag in the long deferred deliveries. For the first half of 1903 No. 2 Foundry was sold at $20 and $21, while No. 4 Foundry went at $18. For deliveries extending from January to June No. 1 Foundry sold at $21 and No. 2 Foundry at $20. No. 3 Foundry sold at $21, delivery from December to April, and at $20, delivery from January to June. For the last half of 1903 No. 2 Foundry was sold at $18.50, deliveries beginning in July. There are intimations given that sales were made at $18, but the writer can, so far, obtain no positive evidence of it. There are good inquiries reported, but the transactions recorded are for only moderate amounts.

The furnace interests are much more interested just now in shipping what they have already sold than in hunting up new business. If cars could only be obtained shipments would be lively for awhile anyway. Iron is yet being piled up in the furnace yards waiting for the promised cars that do not materialize. The shortage of cars is still the burden of the "plaints" in Iron circles, and efforts are concentrated in running down available cars. All shippers are in the same boat and all are attuned to the same chord. The railroad people say there is an improvement in the car situation, but the shipper won't be able to see it until he is furnished cars to transport his Iron. If there is any improvement it is so slight as to be insignificant. The local situation is not a whit better than prevails in the case of long distance shipments and no mine is worked to capacity. Every week and every day therefore adds to the Iron already piled up in the yards.

The shippers are powerless to remedy the existing conditions. Once in a while fortuitous circumstances award a car or two which can be used for emergency orders and it is seized without delay. This explains why, when a car famine is reported, some parties can get out a few cars while others cannot move one. It is a question of good fortune, that's all. While upon the question of shipments it may be well to state that we will go into January with probably 150,000 tons due on belated orders, and it may reach 175,000 tons. That is not an encouraging outlook.

But there is a ray of sunshine in the fact that the leading interest has made no sales for January and February delivery, and the make of those months can and probably will be applied to ease their condition in deferred deliveries. So by the time the month of March rolls around, barring accidents, they will be "in easy circumstances." They are making now at the rate of 60,000 tons per month, which is a material increase over what has been their output. After all, the question with all is one of favorable circumstances. The strain on the managers of Iron interests has been and is yet severe, and they will hail with delight the first evidence of relief. They want a rest.

There is still prevalent the belief that the large consuming interests previously referred to have not yet covered their requirements for the first half of 1903 and that they must come into the market in January to at least partially supply their wants. If this proves true, there can be but one result and that is the maintenance of prices. The importation of foreign Iron is considered to be at its maximum.

The question of the lease of the convict labor of the State has finally been settled by the acceptance of the offers of the Tennessee and Sloss companies. The offer of the former was for 73c. for Coal mined by the convicts and delivered at the tipple at the mouth of the mine. The bid of the Sloss Company was 43c. per ton, delivered at the mouth of the mine. The accompanying conditions are such as to make the cost of mining about the same as they pay free labor. Public opinion seems to be satisfied with this solution of the vexed question.

Articles of incorporation were filed the past week by the Crane Creek Coal & Mining Company, the capitalization be-

ing $200,000. H. F. De Bardeleben is at the head of it. Their operations will be mainly in Bibb County. The Moore & Handley Realty Company also filed articles of incorporation. They are capitalized at $300,000, and it is supposed the main object is to separate the two interests, hardware and real estate, from each other as a matter of convenience. Other articles of incorporation were filed, but they were of no significance.

Tracks are being laid to the Gray Ore field in Talladega County, with a view to the utilization of this rich deposit at an early date, and some brown Ore deposits in the same section are also being opened. There is more or less of prospecting going on and there has been more or less dickering about both Ore and Coal properties of value. But nothing of importance has been concluded, and it is not probable that anything in that line will now be definitely concluded until after the holidays. Shop work keeps up well and there is no complaint from any of them of slack business. The evidences on every side are confirmatory of continued activity in all lines. Before the opening of spring we will have several additions to our established industries. We have as yet but the nucleus of a great expansion. We have only sowed. We have yet to reap the harvest.

Pittsburgh.

(By Telegraph.)

PARK BUILDING, December 10, 1902.

Pig Iron.—While the market on Pig Iron is somewhat quiet, we can report sales of 12,000 to 15,000 tons of Bessemer Iron, all for next year delivery at prices ranging from $21.25 to $21.50, at Valley furnaces. Small lots of Bessemer Iron for early delivery bring slightly higher prices. The Coke situation is no better and furnaces in the Valley continue to bank for want of Coke. Some stacks ran only a few days last month and the outlook is no better for this month. There is practically no buying of Forge Iron and the price is about $20.75, Pittsburgh. Foundry Iron is also quiet.

Steel.—We can report a firm market on Steel and there is some inquiry for next year's delivery. We note sales of about 12,000 tons of Open Hearth Billets, ordinary carbons, at about $31, makers' mill. Steel mills outside the Pittsburgh district quote $27.50 to $28 at mill for Bessemer Billets, which with the freight added makes the price $29.50 to $30, Pittsburgh. These prices fairly represent the market on Bessemer Steel. Not much is doing in foreign Steel, which sold at about $29.50, Pittsburgh.

(By Mail.)

Rails.—The report that the Kansas City, Mexico & Orient Railroad had placed an order for 150,000 tons of Rails with the United States Steel Corporation is incorrect. The facts are that this contract is for about 100,000 tons, and it was placed abroad, because domestic mills could not make deliveries wanted. Up to the present time the Rail mills have secured contracts for about 1,900,000 tons of Rails for 1903 delivery, giving them full work up to October at least. It is practically certain that further large contracts for Rails will be placed abroad, as some of the leading mills have not yet covered their requirements, and will not be able to get deliveries wanted from domestic mills. The Carnegie Steel Company are now making deliveries of Rails to the Pittsburgh, Carnegie & Western Railroad, which is the Pittsburgh extension of the Wabash. These are 90-lb. Rails, and the contracts were placed with the Carnegie Steel Company some time since. We quote at $28 at mill for Standard Sections.

Spelter.—Prices of Spelter are declining very fast, and Prime Western is being offered at 4.87½c., Pittsburgh, for prompt delivery. On a firm offer it is believed this would be shaded. Predictions are being made here that prices of Spelter will be very much lower before the decline stops.

Muck Bar.—The market on Muck Bar is exceedingly dull, and we do not hear of any sales. Prices are weak, and we quote domestic Muck Bar at $33 to $33.50, f.o.b. Pittsburgh. We understand that Eastern Bar is being offered in this city at still lower prices.

Plates.—The demand for Plates is beyond all precedent, and the mills are simply swamped with orders and turning down tonnage almost every day on which they are unable to make deliveries wanted. Some heavy contracts have been placed during the past week for delivery late in 1903, and we understand that several of the leading Plate mills are practically sold up for all of 1903. This is a remarkable condition, and there never was a time before in the history of the Plate trade when the mills had as much tonnage on their books as at present. In spite of this it is not believed there will be any advance made in prices, as the manufacturers will probably continue to pursue their usual conservative policy in this respect. We may note that Plates for prompt shipment continue to bring from 1.85c. to 2c., at mill. Even higher prices have been paid for a few Plates for prompt shipment. Official prices for extended delivery are as follows: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price to 3c. Plate more than 100 inches wide, 5c. extra per 100 lbs. Plate 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra; No. 9, $5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms net cash in 30 days.

Rods.—The market on Rods is quiet, but an improvement in demand is expected after the first of the year. There are fewer customers now for Rods, as several small Wire Nail mills, that formerly bought Rods and converted them into Nails, have retired from the market and are no longer buyers of Rods. We quote Bessemer Rods at $34.50, Pittsburgh. Open Hearth are quoted at $36, Pittsburgh. Prices of Rods are none too firm.

Ferromanganese.—The market is quiet and we continue to quote English Ferro at $50 in large lots, and $52.50 in small lots, delivered anywhere. There is practically nothing doing.

Structural Material.—A good deal of work is being placed. The American Bridge Company have taken some large buildings for the Lorain Steel Company, at Johnstown, involving 2500 tons. Other work that has been placed includes First National Bank Building, Chicago, 12,000 tons; Bindley Hardware Company, new warehouse, 3000 tons, and a good deal of small work. Bridge work is also very active, and it is understood the leading bridge interest has secured contracts already this month for fully 10,000 to 12,000 tons. The outlook is that 1903 will be the heaviest year in the Structural trade ever known. The mills are making somewhat better deliveries, but Beams and Channels for prompt shipments continue to command premiums in prices, and readily bring 2c. to 3c. a lb., depending on tonnage involved and deliveries wanted. Pool prices for extended deliveries are as follows. Beams and Channels up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.65c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c. to $1.85c.

Sheets.—We are advised that a fair tonnage in Black Sheets is being placed and that prices on these are reasonably firm. A report was current last week that the leading interest had made a reduction in prices of Black Sheets, but we are officially advised that this is not true. The Galvanized Sheet market is in very unsatisfactory shape, prices being more or less cut. It is believed that a material improvement in demand for both Black and Galvanized Sheets will come after the first of the year. We quote Nos. 22 and 24 Black Sheets, box annealed, one pass through cold rolls, at 2.45c.; No. 26, 2.55c.; No. 27, 2.65c., and No. 28, 2.75c. For small lots the usual advances are charged. We quote No. 26 Galvanized Sheets at 3.35c., or 75 and 10 off; No. 27, 3.60c., or 75 and 10 off, and No. 28, 3.85c., or 75 and 10 off. All the above prices are f.o.b. at mill. It should be noted that in special cases our prices for Galvanized Sheets are slightly shaded for good orders.

Bars.—The market on Steel Bars is more active and prices are very firm. More tonnage is being received by the mills and specifications on old contracts are coming forward more freely. The outlook is good and indications are that the Bar mills will have plenty of work through the winter months. There is also a good demand for Iron Bars and some of the mills are adhering rigidly to the fixed price of 1.80c., Pittsburgh, in carloads. In special cases a few sales are made at 1.70c. in carloads. We quote Iron Bars at 1.70c. to 1.80c. in carloads and 1.85c. in small lots, half extras, as per National card. We quote Steel Bars at 1.60c., at mill. All specifications for less than 2000 lbs. of a size subject to the following differential extras: Quantities less than 2000 lbs., but not less than 1000 lbs., 0.10 per lb. extra. Quantities less than 1000 lbs., 0.30 per lb. extra, the total weight of a size to determine the extra regardless of length.

Merchant Steel.—There is a fair demand and the tone of the market is steady. The mills are a little short of specifications for this month, but this is probably due to the fact that buyers do not care to take in any more material in December than they can avoid. Prices are firm and we

quote: Tire, 2.15c. to 2.25c.; Spring, 2.25c. to 2.35c.; Toe Calk, 2.30c. to 2.40c., base; Sleigh Shoe, 2.15c. to 2.25c. Differentials are as follows: Less than 2000 lbs. of a size and not less than 1000 lbs., 10c. advance; less than 1000 lbs. of a size, 30c. advance; Cold Rolled Shafting is 47 per cent. off in carloads and 42 per cent. in less than carloads delivered in territory east of the Mississippi and north of the Ohio rivers. Tool Steel is 6½c. to 10c. for ordinary grades and 12c. and upward for special grades.

Merchant Pipe.—The leading interest reports that tonnage in November was 50 per cent. heavier than in the same month last year. Demand so far this month has been very good and the tone of the market is steady. Pittsburgh Basing Discounts for consumers in carload lots are as follows:

	Merchant Pipe, Steel. Blk.	Merchant Pipe. Steel. Galv.	Merchant Pipe, guaranteed Wrought Iron. Blk.	Merchant Pipe, guaranteed Wrought Iron. Galv.	Full weight Steel Pipe. Blk.	Full weight Steel Pipe. Galv.	Full weight, guaranteed Wrought Iron. Blk.	Full weight, guaranteed Wrought Iron. Galv.
⅛, ¼ and ⅜	68	58	65	55	67	57	64	54
½	70	60	67	57	69	59	66	56
¾ to 6	75	65	72	62	74	64	71	61
7 to 12	73	63	70	60	72	62	69	59
Plugged and Reamed:								
1 to 4	73	63	70	60	72	62	69	59
Cut 3 to 6 feet.								
⅛, ¼ and ⅜	63	52	60	49	62	51	59	48
½	65	54	62	51	64	53	61	50
¾ to 6	71	60	68	57	70	59	67	56
7 to 12	69	57	65	54	68	56	64	53
Cut to 6 feet and longer:								
⅛, ¼ and ⅜	64	53	61	50	63	52	60	49
½	66	55	63	52	65	54	62	51
¾ to 6	72	61	69	58	71	60	68	57
7 to 12	70	58	66	55	69	57	65	54
Extra Strong, Plain Ends:								
⅛ to 8	69	59	65	55	68	58	64	54
Threads only	Same as Plain Ends, plus 1¼ per cent., net.							
Threads and Coupl'gs.	Same as Plain Ends, plus 3 per cent., net.							
Double Extra Strong:								
⅛ to 8	61	51	57	47	60	50	56	46
Threads only	Same as Plain Ends, plus 2 per cent., net.							
Threads and Couplings.	Same as Plain Ends, plus 3 per cent., net.							

NOTE.—Orders for less than carloads will be charged at 12½ per cent. advance. Extra and Double Extra Strong cut lengths, lower random discounts by 10 per cent. net for 6 feet and longer, and 15 per cent. net for 3 to 6 feet.

Skelp.—There is practically nothing doing, some of the smaller Pipe mills that buy Skelp in the open market are not able to compete, and have not placed any orders for Skelp for some time. We quote Grooved Iron Skelp at 1.90c. to 1.95c.; Sheared, 2c. to 2.05c., and Grooved Steel Skelp at 1.90c. to 1.95c., f.o.b. Pittsburgh, or 2 per cent. off for cash in 30 days.

Boiler Tubes.—The market is somewhat quiet, but the mills have a good deal of work ahead. Discounts are as follows:

Iron Boiler Tubes.

1 to 1½ inches and 6 to 13 inches	36½ %
2¾ to 5 inches	45½ %
1¾ to 2½ inches	35½ %

Coke.—Output of Coke last week fell off about 40,000 tons, largely due to the shortage of cars and motive power. It is not expected there will be any permanent relief in the situation until next spring. Strictly Connellsville Furnace Coke on contracts is about $4 a ton, and Foundry Coke $4.50 to $5 a ton.

Scrap.—The market on Old Material is very quiet, and not much movement is expected until next month. We quote Heavy Melting Stock at $21 in gross tons; No. 1 Cast Scrap, $19; No. 1 Wrought Iron Scrap, $20.50 in net tons; Cast Iron Borings, $11.50 in gross tons; Old Iron Rails, $25 to $25.50 in gross tons.

Howard M. Hooker, Park Building, Pittsburgh, resident agent in that city of Rogers, Brown & Co. for some years, has resigned his position, to become effective January 1. Mr. Hooker has organized a new firm, to be known as Howard M. Hooker & Co., with a capital of $125,000, to deal in Pig Iron and Coke. A specialty is to be made of High Grade Irons for Roll making purposes and all Foundry grades. The temporary offices are in room 321, Park Building, Pittsburgh, but on completion of the Farmers' National Bank Building, Fifth avenue and Wood street, Pittsburgh, the offices will be located on the seventh floor of that building.

Cincinnati.

FIFTH AND MAIN STS., December 10, 1902.—(*By Telegraph.*)

The market for Pig Iron is no lower, and there are a number of sellers who think it is steadier than it was a week ago. The demand for spot Iron shows a little improvement, but the selling is still confined to small lots. The trade for Iron for delivery after April 1 is almost nothing, as buyers seem to take hold slowly and are not willing and uninterested in the main. Northern Irons are more closely sold up than Southern brands, and on that account are perhaps somewhat stronger. Low grade Southern Irons seem weaker, and while there has been no reported selling on that basis, yet Mill Irons are being offered as low as $15, Birmingham. Sales of No. 4 Foundry are reported on the basis of $16, Birmingham. No. 3 is offered as low as $17, same basis. Spot delivery Iron still holds a premium of $1 to $2 over deliveries to be made later than February. This premium is recognized, however, in the Nos. 1 and 2 Foundry and Soft Irons. Freight rate from the Hanging Rock district $1.10, and from Birmingham to Ohio River points $3.25. We quote, f.o.b. Cincinnati, for delivery to July 1, 1903, freight rates only guaranteed to March 1, as follows:

Southern Coke, No. 1	$23.00 to $25.00
Southern Coke, No. 2	22.25 to 24.25
Southern Coke, No. 3	20.75 to 22.75
Southern Coke, No. 4	19.25 to 20.25
Southern Coke, No. 1 Soft	23.00 to 25.00
Southern Coke, No. 2 Soft	22.25 to 24.25
Southern Coke, Gray Forge	18.25 to 19.00
Southern Coke, Mottled	18.25 to 19.00
Ohio Silvery, No. 1	30.10 to 32.10
Lake Superior Coke, No. 1	26.10 to 26.60
Lake Superior Coke, No. 2	25.10 to 25.60
Lake Superior Coke, No. 3	24.10 to 24.60
Car Wheel and Malleable Irons.	
Standard Southern Car Wheel	$28.25 to $29.25
Lake Superior Car Wheel and Malleable	27.50 to 28.50

Quotations for 1903 shipment, freight rates only guaranteed to March 1, are as follows, f.o.b. Cincinnati:

Southern Coke, No. 1	$22.75 to $24.00
Southern Coke, No. 2	22.25 to 23.25
Southern Coke, No. 3	21.25 to 22.25
Southern Coke, No. 4	20.00 to 21.00
Southern Coke, Gray Forge	20.00 to 21.00
Southern Coke, Mottled	20.00 to 21.00
Southern Coke, No. 1 Soft	22.75 to 24.00
Southern Coke, No. 2 Soft	22.25 to 23.25
Lake Superior Coke, No. 1	26.10 to 26.60
Lake Superior Coke, No. 2	25.10 to 25.60
Lake Superior Coke, No. 3	24.10 to 24.60
Car Wheel and Malleable Irons.	
Standard Southern Car Wheel	$28.25 to $29.25
Lake Superior Car Wheel and Malleable	27.50 to 28.50

Plates and Bars.—The market is rather quiet on the same basis as quoted last week: Iron Bars in carload lots, 1.92c., with half extras; same, small lots, 2.20c., full extras; Steel Bars, carload lots, 1.72c., with half extras; same, small lots, 2.20c., full extras. Plates are quoted nominally, ¼-inch, in carloads, 1.70c.; same, 3-16, 1.80c. As a matter of fact, however, mills having Plates to ship are getting 2.15c. without trouble. I-Beams and Channels, 1.70c., base. All prices f.o.b. Cincinnati.

The New York Machinery Market.

NEW YORK, December 10, 1902.

Orders are not very large or numerous, but a good inquiry is reported. Purchasers are no doubt holding off until after the close of this year. They are, however, sending out their inquiries and getting data in shape preparatory to good sized purchases, and this is accepted in the trade as an indication of an early resumption of activity next year. The outlook for 1903 business is so bright that no fear whatever is expressed over the present comparatively slack demand. Prices are being held firmly and machinery merchants are actively arranging for the increasing of their stocks in warerooms and storehouses, anticipating a good business.

That several large projects, which have been held in abeyance for some time, will be consummated early next year is assumed from the fact that the principals are asking for additional information regarding equipment. One of these is the new plant of Milliken Brothers of 11 Broadway, who are to build a new plant on Staten Island. It will be recalled that this company secured a large tract at Carteret, N. J., but it was marsh ground and required filling in. This work was commenced and, in fact, carried on extensively, but there seemed to be no bottom and the "filling in" operation was abandoned. The Staten Island site, on which it is now proposed to erect the plant, is somewhat larger than the one abandoned and the plans are being altered so as to carry out the entire work on a larger scale. Specifications have been sent out in the machinery trade on certain lines of the equipment. The figures thus obtained, we are informed, are more for the purpose of furnishing an idea of the probable cost, so that the company can base their calculations and guide themselves accordingly. At any rate, it is quite certain that no purchases will be made this year.

It is reported in the street that the Lehigh Valley Railroad Company are to make the long contemplated improvements at Sayre, Pa., early next year. It will be recalled that some time ago plans were prepared for an extensive system of car and repair shops to be located at this point by the company. Only a small portion of the work was actually completed.

Owing to difficulty in obtaining the title to a small parcel of land which, however, is the key to the extensive tract on which the Sterlingworth Car Company intended to build a large plant at Eddystone, Pa., the erection of the plant has not yet been started. This obstacle is about cleared away and we are informed that the work will be pushed rapidly

immediately after the first of next year. The plant is to be a great one, with principal buildings 300 x 600 feet. David Townsend, consulting engineer, with offices at 1103 Penn Square Building, Philadelphia, is obtaining data preparatory to the purchase of the equipment. Mr. Townsend, we understand, is to purchase the entire equipment. Aside from the steel car plant, it is possible that a complete steel plant will also be erected.

A cable from Europe announces that Fraserburgh, near Aberdeen, Scotland, has been selected by the Chicago Pneumatic Tool Company for their British works. It is also stated that the plant is to cost $400,000. Confirmation of this cannot be obtained as yet owing to the fact that J. W. Duntley, president of the Chicago Company, has not arrived from Europe. His steamer is due to-day, but at this writing has not been sighted.

The report which has gained considerable prominence in the trade that the B. F. Sturtevant Company of Boston intend establishing a European factory is officially denied. The company state that they "have never even considered such a matter."

There has been renewed activity of the parties promoting a consolidation of the manufacturers of twist drills. This matter has been up before, but as yet nothing definite has been accomplished.

There are additional reports in the street regarding the advance of the steam turbine. The General Electric Company are said to have disposed of two 5000 kw. machines to the St. Louis Transit Company and two 1000 kw. machines to the Cleveland, Elyria & Western Railway Company. Two Westinghouse turbines were sold to the Goodrich Rubber Company, for installation at Akron, Ohio. They are to be of 450 and 750 k.w., respectively.

Reports state that both the Westinghouse and General Electric companies are preparing to build mica plants in Canada. The Westinghouse plant, it is said, will be built in Ottawa. Hooven, Owens & Rentschler have closed with the Perry Payne Company of Cleveland for a 450 horse-power direct connected simple engine, which is to be used in a new office and power building to be erected in Cleveland. Westinghouse generators and Aultman-Taylor boilers will be used.

Trade Publications.

The Cadman Specialties.—We have received a package of printed matter from the A. W. Cadman Mfg. Company, Pittsburgh, Pa., treating of the specialties placed on the market by this company. The Indestructible blow off valve is a valve in which both the disc and seat are made reversible to facilitate repairs, the change being easily made without the use of any tools except a wrench of suitable size. The Indestructible gauge cock is made with a positive shut off and with both valve and seat reversible, thus making practically two in one. Cadman's Aluminum babbitt metal, Acorn brand, is presented as a bearing metal of especially high grade, which it is stated has become the standard of 5000 regular customers throughout the United States, Canada and Mexico. A specimen of this metal is furnished in strip form, which shows its bright, smooth surface and enables its remarkable tenacity to be easily tested.

Pneumatic Tools.—Joseph T. Ryerson & Son, Chicago and New York, have issued a second edition of catalogue No. 6 of their series entitled, "Ryerson's New Technical Library." No. 6 is devoted to pneumatic tools and is divided into five parts. Part 1 relates to pneumatic hammers for riveting, chipping and calking. A number of effective illustrations of the Boyer long stroke riveter and Boyer hammers accompany the descriptive matter. Part 2 is devoted to penumatic drills, flue rollers, reamers and tappers, wood borers. Part 3 contains an account of some disinterested tests made by railway officials, with conclusions made by competent authorities. Part 4 is devoted to a technical consideration of pneumatic tools, with extracts from reports before the Institute of Mechanical Engineers of Great Britain. Part 5 relates to compressors, hoists, derricks, &c., with some information as to size, capacity, horse-power, prices, &c. The book also contains some practical hints on the use of compressed air as contained in an extract from a circular letter recently issued by J. L. Phillips, M.E.

Perforated Metals.—The Allis-Chalmers Company, Chicago, have issued the ninth edition of their No. 7 catalogue entitled, "Perforated Metals." A large portion of the catalogue is devoted to illustrations of the various patterns of metals, which can now be readily supplied from the working of improved machinery, installed recently. The second portion of the catalogue is devoted to the manufacture of revolving screens, with illustrations. A number of valuable geometrical tables, adapted to the needs of metal workers, is supplemented by a comparative table of the English and metric system of weights and measures, together with the specific gravity and weight of various materials. A dictionary of code words is appended. In calling the attention of the trade to perforated metals the superiority of such material over wire for specific purposes is dwelt upon. Strength, uniformity of size of hole or mesh and less liability to tear or rust are alluded to. In case of accidental breakage repairs are easily made without affecting the entire sheet or without changing the mesh. It is noted that it is often desirable to arrange screens with certain perforations blank, and while this may be accomplished when perforated metals are used, it is impossible with wire cloth. The perfectly smooth surface of the metal, too, allows grain, ore or other material to pass quickly without interruption, the liability to clogging being reduced to the minimum. The use of the metal is therefore desirable in cleaning, sizing and separating operations. Iron, copper, brass, steel, zinc, tin and other metals of various thicknesses are used from No. 30 wire gauge to ⅜ inch. In a table the standard sizes of steel plates usually carried in stock are given and orders covering these sizes will naturally be filled more promptly and at less cost than special plates for mill shipment.

Omega Steel.—The National Tool Company, New Haven, Conn., have issued a neat pamphlet which treats of the special features and qualities of Omega steel, a new product intended for use in making tools for cutting cast and wrought iron and steel at a high rate of speed. It is sold only in lathe tool lengths, or tools are made to order. A list of stock sizes is given.

Tramway Locomotives.—The Climax Mfg. Company of Corry, Pa., build locomotives adapted for use on both wood and light steel tracks. The engine is capable of hauling heavy loads on steep grades and sharp curves, and is very simple to operate and easy to run. The engines are made in several different styles and sizes.

Fuel Oil Equipments, consisting of boilers, tanks, stacks, and all classes of steel plate construction, are furnished by the Petroleum Iron Works Company of Washington, Pa. In the catalogue before us much valuable information is presented regarding the comparative value of coal and oil as fuels.

Road Rollers are illustrated in a catalogue by the Erie Machine Shops of Erie, Pa. This type of steam roller is especially adapted for use on asphalt and brick pavements, low crowned macadam roads, race tracks, &c. The characteristic features of these machines are strength, durability, simplicity, ease of manipulation and positive motion of all the actuating parts. All parts are made in duplicate, so that in case of accidental damage, the injured part can be quickly replaced.

Gas Furnaces and Flexible Shafts.—From the Chicago Flexible Shaft Company, Chicago, we have received a catalogue describing their gas blast furnaces, flexible shafts, &c. The Stewart combination gas furnace combines on one base three most useful furnaces for general machine shop and tool work. It will heat quickly and uniformly any piece or pieces that will go into its various openings. The muffle can be heated to a sufficient degree for hardening in from 10 to 12 minutes and kept at the desired temperature indefinitely. The forge will heat a piece 1 inch diameter to a good hardening heat in one minute, starting with the furnace cold. The crucible full of lead can be heated to a cherry red in 35 minutes. This saving of time, as compared with the coal or coke furnace, will more than pay for the fuel consumed.

Annealer and Rivet Heating Forge.—The Chicago Pneumatic Tool Company, Chicago, have prepared a special circular illustrating the Tynan patent annealer and rivet heating forge. The company have secured the entire control of these devices and will in the future be the exclusive manufacturers of them. The annealer and rivet forge fit in very nicely with the line of pneumatic appliances which the company manufacture, as they operate by compressed air, using crude oil as a fuel. They are designed for the various classes of repair work incident to shipyards, railroad shops, &c., and repeated demonstrations have proven them to be superior for this class of work. Both machines are light in weight and therefore easily moved from place to place—an important feature in the class of work for which they are adapted.

Clutch Pulleys and Air Compressors.—Pamphlets have been received from the Jacobson Machine Mfg. Company of Warren, Pa., describing their clutch pulleys and water jacketed air compressors. The most noticeable feature of the pulley is its extreme simplicity. The adjustment is so simple that any one can accomplish it in a very few minutes. It consists of lengthening the links which extend from the sliding collar to the ends of the arms by a turn of the turn buckle. The air compressor is made especially for starting gas engines. It is also adapted for bicycle repair shops or for any other purpose where a small first-class air compressor is required. It is made in single and double cylinder patterns.

Open Hearth Steel Castings of all descriptions are described by the American Steel Casting Company of Chester, Pa. The engravings show castings for gun carriages, anchors, Bessemer converter trunnions, gears, locomotive side rods, engine bed plates and pistons, &c. Tests made of this company's steel by the Board of Steel Inspectors, United

States Army, showed tensile strength from 63,000 to 79,000 pounds, elastic limit from 31,000 to 38,000,, elongation 20 to 33 per cent., and reduction of area from 30 to 50 per cent.

"Lubriphite."—We have received a pamphlet from the Lubriphite Company of Jersey City, N. J., descriptive of their "lubriphite," or "graphite suspended in oil." Lubriphite is a mixture of pure oils and graphite. It contains no chemicals, soaps, &c. It violates no laws of specific gravity. The graphite is held in suspension by opposing to gravity forces resistant to movement. These forces depend entirely on the combined adhesion of the prepared particles of graphite and oil. So long as the cling is greater than force of gravity the suspension is complete. It may be fed through any approved type of lubricator; it gives a uniform automatic and economic feed of graphite. It has been used with great success for lubricating the cylinders of steam, oil and gas engines.

Metal Market.

NEW YORK, December 10, 1902.

Pig Tin.—Just before the close to-day this market finally responded to the efforts which have been directed toward raising it. Earlier in the week under review the London market advanced £1 to £113 17s. 6d., and strenuous efforts were made to lift this market, but without success. The London market then commenced to drop and fell below last week's spot quotation to £111 15s., but to-day it rallied to £112 5s., and this market took a turn and scored a slight advance over last week. Prices here now are 24.85c. to 24.95c. for spot, 24.80c. to 24.90c. for December, and 24.65c. to 24.80c. for January. The London market closed £112 5s. for both spot and futures. Now that the premium on spot has been wiped out, it is feared in the trade that soon the premium will be on futures. Several opinions as to the cause of this are to be had in the trade, the chief ones being that it is now necessary to carry larger stocks and that money is somewhat higher than previously. Only 642 tons have arrived here so far this month, and about 2270 tons are afloat.

Copper.—This has been a week of rumors, and in the enthusiasm which ran the quotations of Copper stocks upward the price of the metal was also nominally raised. Business in the metal was, however, no more active than for weeks past, as consumers placed no faith in the reports which ran rampant and continued their policy of buying only according to their absolute needs. There were stories of large purchases by consumers, but they were without foundation. There was nothing new in the rumors that caused the flurry of excitement among those who are not familiar with the Copper trade. The gist of all the reports was that an agreement had been reached by the Amalgamated and Calumet & Hecla interests and that the former concern would control the output of the latter after January 1. No official statements regarding the matter could be had, but the Copper trade treated the reports as without basis. Prices at present are: Lake, nominally 11.65c.; Electrolytic and Casting, nominally 11.45c.; Standard, nominally 10.75c. London advanced to £51 12s. 6d. on spot yesterday, but reacted and closed to-day £50 10s. for spot and £51 3s. futures. Best Selected, after reaching £55 5s. yesterday, declined to £54 15s. to-day. Exports thus far this month amounted to 3900 tons.

Pig Lead.—The market is dull and uninteresting. Here there is absolutely no change, the official price remaining on a basis of 4.10c. for futures, and 4.12½c. for spot desilverized, New York. The London market advanced a shade to £10 13s. 9d.

Spelter.—Prices have fallen considerably and it is evident that the slight purchases of consumers have resulted in a marked increase of the available supply. Producers are competing sharply for the little business that is being placed and consumers are standing aside, buying only such stocks as are required for immediate needs and seeing prices steadily recede. The market is now very weak. Spot is quoted 4.95c. here, and shipments can be had at 4.85c. In St. Louis there are sellers a plenty at 4.60c. The London market is without change at £19 17s. 6d.

Antimony—Is lower, Cookson's being quoted 8½c. to 8¾c., Hallett's, 7⅛c. to 7⅜c., and other brands, 6¾c. to 7c.

Nickel.—No change is noted. Large quantities down to ton lots are now quoted at 40c. to 47c. per lb., according to size and terms of order. Smaller lots are quoted as high as 60c., according to quantity.

Quicksilver.—The market is quiet and unchanged, the ruling quotations being $48 per flask of 76½ lbs. each in lots of 50 flasks or more. London is unchanged at £8 15s.

Tin Plates.—As stated last week, this being the season for purchases of the canning trade, transactions are rather heavy. Both the American Tin Plate and the Union-Sharon interests are obtaining these orders. Prices are unchanged and there have been no new developments other than a slight advance of Welsh Plates. The Welsh market is now just below the point where it would be possible for the American Company to go in for the seaboard export trade. The Welsh plants are now operating but three weeks a month. Present official prices are based on $3.60 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, and $3.79, New York delivery. These prices, it is understood in the trade, will hold until April.

There has just been issued by the Metallgesellschaft and the Metallurgische Gesellschaft of Frankfort-on-the-Main the ninth annual review of all the leading metals. It is the most complete statistical summary which we possess. The American Metal Company, Limited, of 52 Broadway, represent the German firms. The pamphlet is printed in English and covers the period 1892-1901.

New York.

NEW YORK, December 10, 1902.

Pig Iron.—The market in this district is exceedingly quiet, and reports from foreign producing centers show a further downward tendency. Middlesbrough No. 3 can now be sold by importers, in cargo lots, at a shade under $17.75, ex-ship, duty paid, cash, which indicates the position well. Very little is being done in buying foreign Iron for importation. For the first half of 1903 the following nominal quotations are made: Northern Iron, at tidewater, No. 1 X, $24.50 to $25; No. 2 X, $22 to $22.75; No. 2 Plain, $21.50 to $21.75. Tennessee and Alabama brands, in New York and vicinity: No. 1 Foundry, $25 to $25.50; No. 2 Foundry, $23.25 to $24; No. 3 Foundry, $22.50 to $23.

Steel Rails.—The Rail mills now have on their books orders for 1903 aggregating 1,802,000 tons, among those recently placed being 10,000 tons each for the Mobile & Ohio and for the Southern Railway and 25,000 tons for the Big Four. Importers have in hand inquiries for about 100,000 tons, including 50,000 tons for the Southwest and 50,000 tons for Canada. Among the recent transactions is a lot of 1000 tons of foreign Girder Rails, sold by A. M. Crane & Co. of New York, for delivery to Havana, Cuba. We continue to quote $28 at mill for Standard Sections.

Cast Iron Pipe.—Usually the season has practically ended by this time and the foundries are making repairs, but this year the demand has kept up so well that the largest foundries are still running on full time. Some excellent orders have come out lately. Bids were opened at Troy a few days since for about 5000 tons of 30-inch Pipe to be delivered this winter. A Massachusetts order, covering between 2 and 3 miles of Pipe, will soon be placed. Other interesting contracts are taking shape. Prices continue as recently quoted: 6-inch, $36, and 8 to 12 inch, $35.50, gross ton, at tidewater.

Finished Iron and Steel.—Structural contracts have not been specially important the past week. The leading interest has secured the First National Bank building at Chicago, 5000 tons, and an armory at Buffalo, 1500 tons. The Chicago structure will take about 12,000 tons of material in all, but other parties will be allotted the remainder of the work. Bridge work has been quiet, but as the bridge companies are not in a position to promise anything like early delivery the dullness in this line is causing no uneasiness. Structural mills are doing better so far as turning out tonnage is concerned, but deliveries are seriously delayed for lack of cars. A better demand for Plates is reported, with some fair sized vessel contracts placed by consumers in this vicinity. A much heavier trade is expected after the inventory season. Heavy Plates are very firm, but Light Plates, Nos. 8 to 12, are in such ample supply that concessions are made to secure business, resulting in bringing No. 12 to almost the same rate as ½-inch. Concessions are also being made on Bars for future delivery. We quote, at tidewater, as follows, but for small lots and prompt delivery higher prices are being obtained for Structural Material: Beams, Channels and Zees, 2c. to 2.25c.; Angles, 2c. to 2.25c.; Tees, 2c. to 2.25c.; Bulb Angles and Deck Beams, 2.10c. to 2.25c. Sheared Steel Plates are 2.10c. for Tank, 2.20c. for Flange, 2.35c. to 2.40c. for Fire Box. Refined Bars are 1.90c. to 2c.; Soft Steel Bars, 1.80c. to 1.90c. Foreign Beams are 1.75c. and Angles 1.80c., ex-ship, New York, in large lots.

Old Material.—Cast Scrap is the only thing in this line which is in good demand. The rolling mills and Steel works are not buying stock to any extent. They are so generally out of the market that their attitude indicates concerted action to force prices down. Nevertheless, stocks of Old Material are declared to be light, and when a consumer must have something he cannot pick up a bargain. Under the circumstances holders are waiting and are not disposed to press sales, believing that a revival in the demand will come after the new year opens, if not before. Selling quotations are as follows, per gross ton, f.o.b. cars in this vicinity:

Old Iron Rails	$22.00 to $22.50
Old Steel Rails, long lengths	20.00 to 20.50
Old Steel Rails, short pieces	18.00 to 18.50
Relaying Rails, heavy sections	29.00 to 30.00
Relaying Rails, lighter sections	33.00 to 35.00
Old Car Wheels	19.50 to 20.00

Old Iron Axles	25.50 to	26.00
Old Steel Car Axles	24.50 to	25.00
Heavy Melting Steel Scrap	18.00 to	18.50
No. 1 Railroad Wrought Scrap Iron	20.00 to	21.00
Track Scrap	18.00 to	18.50
Busheling Scrap	14.00 to	14.50
No. 1 Machinery Cast Scrap	19.00 to	20.00
Stove Plate	13.00 to	14.00
Wrought Turnings, delivered at mill	16.00 to	16.50
Cast Borings, delivered at mill	9.50 to	10.00

Iron and Industrial Stocks.

The week has been dull and uninteresting. Transactions were light and fluctuations within narrow limits, due to the waiting policy pursued by the leaders in the stock market until the financial situation becomes more favorable for speculation. Money continues tight and is expected to remain so until after the requirements of January 1 have been provided for. Steel, common, ex-dividend, sold at 35½ on Wednesday. Colorado Fuel ranged from 84½ to 86¼ during the week. The contest for control in this company has been ended amicably. The three interests will each be represented on the Board of Directors by four members, and the thirteenth member will be taken from outside.

One of the interesting developments of the week was a decline in the prices of American Bicycle shares to the lowest figures on record, which occurred on Friday. The common sold down to ½ (50 cents), while the preferred dropped 1½ points to 4½. When it is borne in mind that a commission of one-eighth must be paid in purchasing stock, the purchaser of the common shares at ½ would actually find its value to him reduced to ⅜, or 37½ cents a share. The par value is $100. The selling was due to the report that under the reorganization plan both the common and preferred stockholders are to be assessed $9 per share.

The British Westinghouse Electric Company of London, England, whom the Westinghouse Electric & Mfg. Company own and control, will increase their capital by issuing $1,000,000 of new 6 per cent. preference shares, the capital now being $5,000,000 of 6 per cent. preference shares and $3,750,000 ordinary shares. The new stock will be issued on account of the great growth in the company's business. Orders received since August 1 exceed in amount $4,125,000, against a total of $4,660,000 for the year ending July 31. Profits for the year ending July 31 were $303,430. The Pittsburgh Company own all the ordinary shares. Montague Cradock has been made a director to succeed Lemuel Bannister.

Last week on the Pittsburgh Stock Exchange, 90 was bid for stock of the Westinghouse Machine Company of Pittsburgh, the par value of which is $50.

On January 1 the Pittsburgh Steamship Company, a constituent interest of the United States Steel Corporation, will redeem at the Union Trust Company, Pittsburgh, $187,000 of their 5 per cent. first mortgage bonds at par and accrued interest.

Dividends.—The National Enameling & Stamping Company have declared the regular quarterly dividends of 1¾ per cent. on their preferred stock and 1 per cent. on their common stock, payable January 1. Books close December 16 and reopen January 2.

The General Electric Company have declared the regular quarterly dividend of $2 per share on their common stock, payable January 15 to stockholders of record December 20.

The International Steam Pump Company will pay a quarterly dividend of 1 per cent. on their common stock on January 2.

The Malleable Iron Founders.—CHICAGO, ILL., December 9, 1902.—A meeting of the Malleable Iron Founders will be held in Chicago Wednesday for the election of officers and arrangement of other details. The consolidation will be effective on January 1.

Thomas O'Connor Jones, formerly superintendent of the Soho Works of the Jones & Laughlin Steel Company of Pittsburgh, has been made assistant general manager of all the works of the Jones & Laughlin Steel Company in Pittsburgh, embracing the Soho Furnace, Soho Works, Eliza Furnaces and American Iron & Steel Works. William Larimer Jones is general manager of these plants.

George D. Wick, formerly president of the Youngstown Iron Sheet & Tube Company, will, in the future, make his home in New York City.

The rail mill of the Maryland Steel Company, at Sparrow's Point, Md., recently rolled 1677 tons in 24 hours.

American Electrical Machinery in Asia.

The State Department has received from Minister Allen of Seoul, Korea, extracts from a report published in a Japanese newspaper, in which very favorable mention is made of the plant of the Seoul Electric Company. The plant in question is said to be the largest single electrical plant in Asia. It was built for the Korean Company by an American firm—Collbran & Bostwick—who hold the property under mortgage. The company operate an overhead trolley road of some 12 miles, and, with the same power, furnish incandescent and arc lights for the city. The generating machinery consists of two 120-kw. double current generators from the Westinghouse Electric & Mfg. Company of Pittsburgh. Babcock & Wilcox boilers are used. The special point about the generators is that they produce direct current at 550 volts for use of the cars, and at the same time alternating current for the electric lighting. There are something over 1400 incandescent lights besides the arc lights in use. High voltage alternating current is most advantageous for a city like Seoul, where lights are scattered over long distances. The consulting engineer is a Japanese, a graduate of the Massachusetts Institute of Technology. The railway is being well patronized by the natives.

A New Rail Mill.—In all probability the Union Steel Company will build a large rail mill at Donora, Pa. An official statement of the matter has been issued as follows: "We propose to build a steel rail mill either at Donora or Sharon which will cost $5,000,000, that will be almost as large as the Edgar Thomson Works of the Carnegie Company. We expect to expend from $25,000,000 to $30,000,000 in improvements. We have had plans prepared for an extension of the West Side Belt Line into the Connellsville coke country and down the Ohio, along the Beaver and through Sharon to Elk Harbor."

Captain Edward K. Holton, formerly secretary and treasurer of the St. Louis Shovel Company, St. Louis, died suddenly at his residence in that city on the 2d inst. Captain Holton was 61 years of age, and was a veteran of the Civil War. After the war he went to Iowa, where he was engaged in the banking business for several years, removing to St. Louis about 1870, and joining the firm of Semple, Birge & Co., dealers in agricultural implements. Subsequently with J. C. Birge, now president of the company, he organized the St. Louis Shovel Company and continued as secretary and treasurer until about two years ago, when he retired from business.

The Jones & Laughlin Steel Company of Pittsburgh are going steadily ahead with their project of building a railroad from one of the lower lake ports to their mills and furnaces in the Pittsburgh district. Rights of way are being secured, and it seems certain now that this road will be built by the Jones & Laughlin Steel Company alone. The report that the new Union Steel Company would be identified with the building of this road is untrue.

The difficulty between the Mesta Machine Company of Pittsburgh and the Machinists' Union over the introduction of the premium system by the company has been adjusted by arbitration. It was unanimously decided by the board that the company did not violate their agreement with the union, and that it considers the premium system an improvement in shop conditions.

Bessemer pig iron is being successfully made in the new blast furnace of the Carnegie Steel Company at Bessemer, Pa. This furnace was built in just 221 days from the time ground was broken, and all the work of construction was done by the Carnegie Steel Company. They also furnished all the equipment, with the exception of the blowing engines.

HARDWARE.

THAT there are evils connected with the system of syndicate buying, as for years it has been practiced in the Hardware trade, is unquestioned. It has in various ways been something of a disturbing influence in the market. This has been especially the case when small houses and possibly retail houses—if the allegations of the opponents of the system are sustained—received quotations to which only the jobbing trade are entitled. This obviously tends to break down the differential which is made by most manufacturers in favor of their wholesale customers. The advantage also which certain smaller houses are supposed to secure from such connections makes it necessary for the competitors of such smaller houses to buy goods at similar prices that they may be able to hold their own in the strife for business, and under this pressure both manufacturers and jobbers have been constrained to make concessions which are contrary to their inclinations and out of harmony with their regular scheme of quotations. While the correction of the evils of syndicate buying is thus an important matter for the jobbing trade, it is also an effort in which they will have the general sympathy of the manufacturers. The problem, however, as to the manner in which the objectionable features of the system are to be combated is not a simple one. The lines on which the association which best represents the jobbing trade is approaching it are perhaps as practicable as any and as likely to be attended with at least some measure of success.

Those who oppose on principle the whole system of syndicate buying naturally look somewhat askance on the proposed indorsement of it by the jobbers. The point they make is that if the National Hardware Association, through its officials, approve of the lists of houses for whom the several syndicate buyers act, after having secured the elimination of objectionable houses from such lists, there is in this action a formal recognition of syndicate buying as an established feature in the trade. Instead of being regarded with questioning it will, its opponents say, have been passed upon by the highest authority in the jobbing trade as a legitimate channel for the purchase of goods. The force of this consideration is obvious, but as the system for many years has had the practical support of probably the majority of jobbing houses of any importance such further indorsement is scarcely needed and certainly has less significance than it would otherwise possess. At the same time this formal, it might almost be said official, approval of it, if given, will obviously put the system in a new position of dignity and strength.

Thus far, however, no great progress has been made in reaching an understanding between the National Hardware Association and the representatives of the existing syndicates, and it remains to be seen whether or not their views can be brought into harmony. On the face of it it does not seem a simple matter to determine the question as to the houses who can properly have place as members of the syndicates for the purchase of goods, especially when the interests of the great jobbers are considered. Assuming that such details can be settled on an equitable basis, at this stage in the progress of the negotiations the matter of most significance is the recognition it is intended to give to the whole system. Perhaps, all things considered, the course taken by the jobbers is a wise one, but a little reflection will make it plain that the approval of syndicate buying, even under the restrictions with which those now concerned in the movement desire to invest it, may be the establishment of a principle which applied in other directions may be found troublesome.

This is, however, a feature of the Hardware as well as of other trades which apparently has come to stay, and it is probably the part of wisdom to endeavor to free it from objectionable characteristics rather than to make a vain attempt to abolish it. The manner in which they will make use of it in the purchase or distribution of goods is, however, a matter which rests with each merchant and manufacturer to determine for himself. Their feeling toward it, as shown not in public utterances but in the use they make of it, will determine the place for good or evil which the system will have in the trade.

Condition of Trade.

That the general movement and large consumption of manufacturing products keeps up in practically unabated volume throughout the country is indicated in many ways. There is with the near approach of the holiday season a letting up in the demand made upon the manufacturers and jobbers by the trade generally, but notwithstanding this fact many orders are coming in and business is certainly active considering the advanced stage of the year. There is still some belated ordering for the holidays, and the coming of cold weather has stimulated the call for winter goods. The sale of the fancier and finer articles, which are gradually taking their place in Hardware stocks far more generally than previously, is larger this year than ever before. In this regard the retail merchants are following the example of the jobbers, whose lines have within recent years been widely extended so as to cover many departments which in former days were not included in a Hardware stock. The changes in market values during the week under review have been unimportant. There is in certain lines something of a weakness, but the general run of Hardware is firmly maintained in price. The tendency to consolidate manufacturing interests continues, and in its different phases finds illustration in the acquirement of minor New England Screw plants by the American Screw Company, and in the efforts that are still making to carry out the contemplated consolidation of Axe and Tool interests which, owing to some delay in the negotiations, has not been consummated as yet. Among the orders coming in to manufacturers are a fair number for next season, as the trade, while having no disposition to buy in excess of their requirements for next year, are anticipating an excellent trade, and are consequently making liberal provision for it.

Chicago.

(By Telegraph.)

From a news standpoint, the most interesting feature of the week is the renewal of rumors in regard to the combination of Edge Tool manufacturers. It is now claimed that the project has a fair prospect of consummation, and that the consolidation may be effected in the near future. It is also reported that in that case prices of Scythes and Edge Tools will probably be advanced. The only other news affecting prices relates to articles manufactured from Tin Plate, the recent reduction in the price of which is held responsible for the lower prices of Tinware. The decline, it is reported, will be from 5 to 10 per cent. The zero weather experienced during the past few days has brought a flood of urgent orders for all sorts of cold weather goods, includ-

ing Coal Hods, Elbows and kindred lines. A second crop of orders for holiday goods, too, has appeared in the jobbing trade, with an increased distribution of Cutlery, Plated Ware, Enameled Goods, Sleds, Skates, &c. The trade in the latter two articles has been exceptionally brisk and unusual even for this time of year. In Builders' Hardware a few orders for spring delivery have been booked, but as a rule manufacturers are discouraging this sort of business. Sales for current delivery have now been reduced to the minimum as usual at this season. There has been an increased demand for Steel Goods for spring delivery, but there has been less demand for Heavy Hardware as usual at this time of year. In Wire and Nails business has been very satisfactory, the largest interest now being unable to take on additional tonnage of appreciable amounts for the balance of December. There has been considerable activity incidental to the advance in freight rates, which will take place on the first of the year. The market for Wire and Nails is also gradually hardening, and a number of independent manufacturers have withdrawn quotations made some time since and which have not been accepted. There has been a fair movement in Screws, but the trade is still unsatisfactory because of the large discounts prevailing. Bristle goods, which are now entering more and more into the Hardwareman's stocks, following the increased volume of Paint business are being sold to a considerable extent for spring delivery.

St. Louis.

(By Telegraph.)

The approach of the holidays is bringing about a slight let up in the general activity of trade in the Hardware market, but this is the usual condition at this season. Salesmen are coming in off the road to square up their business with their different houses and to receive schooling and general instructions for the coming year's campaign. Stock taking is in progress with some, and one of our principal companies will celebrate the advent of the new year by taking possession of their beautiful and finely equipped new building. Every one of the jobbers at this point looks forward to and is preparing for an enormous spring demand, and it might be said that this class of trade has already made a very substantial start. The heavy department is sharing in very satisfactory conditions of trade, and while the progress has not been so rapid with this class of jobbing, trade has been of a substantial order.

NOTES ON PRICES.

Wire Nails.—The situation in the market is considered more satisfactory than for some time. The market is reported as having a firm tone, while specifications on contracts and new business result in a large output from factories. Jobbers anticipate their requirements from 15 to 30 days, and yet find it difficult to keep up their assortments owing to inadequate transportation facilities. In this connection the opinion has been expressed that those who place orders early after the first of the year will be the most fortunate in getting Nails and Wire in time to meet the spring demand, as shipping facilities are not likely to improve. Manufacturers are discouraging the placing of orders for shipment later than the present month. Quotations are as follows:

Jobbers, carload lots	$1.85
Retailers, carload lots	1.90
Retailers, less than carloads	2.00

New York.—Wire Nails continue in good demand, so that jobbers have difficulty in keeping up assortments. The latter is owing to poor transportation facilities, although jobbers anticipate their requirements for some time in advance. Quotations are as follows: Single carloads, $2.05; small lots from store, $2.10. The latter price is sometimes slightly shaded.

Chicago, by Telegraph.—Orders have been received by the leading interest to such an aggregate amount that the taking on of further tonnage for December shipment is a matter of difficulty. The advantage of placing orders early for shipment during December was generally early recognized because of the prospective advance in freight. A number of the independent manufacturers have withdrawn quotations previously given which involve shipments after the first of the year, probably the higher freight rates compelling such action as a step toward protection. The jobbing trade has been fair and the market has remained firm. Official prices have continued firm at $2 in carload lots and $2.10 in less than carload lots, mill shipment, Chicago.

St. Louis, by Telegraph.—Trade conditions show improvement in the demand for Wire Nails from the jobbers. In small lots from stock $2.15 is quoted.

Pittsburgh.—Manufacturers report a considerable improvement in demand for Wire Nails, and believe spring trade will open up vigorously late in January or early in February. Specifications of contracts are coming in more satisfactorily than for some time. The tone of the market is fairly strong, there being almost an entire absence of cutting in prices. We quote Wire Nails at $1.85 in carloads to jobbers, $1.90 in carloads to retailers and $2 in small lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days. For galvanizing Nails 75 cents per keg is charged, and for tinning Nails $1.50 per keg extra.

Cut Nails.—There is a firm tone to the market and demand about absorbs the output of the mills. Some mills have difficulty in accumulating stocks, although less than carload orders is the rule. Quotations are as follows: $2.05, base, in carloads, and $2.10 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

New York.—The local demand for small lots from store is about in the usual proportion to Wire Nails. The market is firm at the following quotations for carloads and less than carloads:

Carloads on dock	$2.18
Less than carloads on dock	2.23
Small lots from store	2.30

Chicago, by Telegraph.—There has been a fair degree of activity, but orders have not been large nor have stocks been increased to any extent. A firm tone has continued to prevail, with sales on the basis of $2.15 in carload lots and $2.20 to $2.25 in less than carload lots for Steel, Chicago. Iron Nails are sold on the basis of $2.30 in jobbing lots from store, Chicago.

St. Louis, by Telegraph.—A better demand exists in the market at this point for Cut Nails. Jobbers are quoting in small lots from store $2.30.

Pittsburgh.—There is a fair volume of business in Cut Nails and some delay is experienced in getting prompt deliveries, owing to scarcity of Steel and also to inadequate shipping facilities. There is a continued scarcity of Iron Cut Nails, which bring 15 cents advance over Steel in territory west of Buffalo. We quote Steel Cut Nails as follows: $2.05 base, in carloads, and $2.10 in less than carloads, plus freight in Tube Rate Book to point of destination, terms 60 days, less 2 per cent. off in 10 days.

Barb Wire.—The aggregate quantity of Barb Wire being distributed is quite large in volume, although the demand is unevenly divided among various sections of the country. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots	$2.15	$2.45
Retailers, carload lots	2.20	2.50
Retailers, less than carload lots	2.30	2.60

Chicago, by Telegraph.—A heavy tonnage has been booked in this line for December delivery, the aggregate sales showing a substantial increase over the volume of business transacted at the corresponding period a year ago. Orders have been so freely booked that it is now difficult to accept any tonnage of appreciable amount for shipment in December. The market has continued firm in tone. Official quotations for Galvanized are $2.60 for carload lots and $2.70 in less than carload lots; Painted sells at $2.30 in carload lots and $2.40 in less than carload lots, Chicago. There is a fair

demand for Staples, and the market remains steady at $2.05 in carload lots and $2.15 in less than carload lots.

St. Louis, by Telegraph.—The market for Barb Wire shows steadiness, and some improvement in volume of inquiry and demand is reported. Jobbers are quoting in small lots from stock Painted at $2.50 and Galvanized at $2.80.

Pittsburgh.—A good demand for Barb Wire is reported from the Western States, but in the East it is very dull. Specifications on contracts are not coming forward as freely as manufacturers would desire. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. off for cash in 10 days: Painted, $2.15; Galvanized, $2.45, in carload lots to jobbers; Painted, $2.20; Galvanized, $2.50, in carloads to retailers; Painted, $2.30; Galvanized, $2.60, in small lots to retailers.

Plain Wire.—Demand is of limited volume, but the market is firm in tone, with prices fairly well maintained. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads	$1.75
Retailers, carloads	1.80
Less than carloads	1.90

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

6 to 9	10	11	12 and 12½	13	14	15	16	17	18	
Base	$0.05	.10	.15	.25	.35	.45	.55	.70	.85	Plain.
$0.30	.35	.40	.45	.55	.65	1.05	1.15	1.70	1.85	Galv.

Chicago, by Telegraph.—There has been a further increase in the placing of contracts for December shipment and further specifying on old orders, resulting in firm tone with full prices realized. Nos. 6 to 9, in carload lots, are quoted at $1.90, base, on track, and $2 from store, Galvanized selling at 30 cents extra for Nos. 6 to 14, spot.

St. Louis, by Telegraph.—Jobbers are handling a fairly steady volume of business for Plain Wire, and quotations are very generally maintained. In small lots from store No. 9 at $2.05 and Galvanized at $2.33 is quoted.

Pittsburgh.—Business being placed is light and prices are only fairly firm; however, the large manufacturers are adhering rigidly to fixed prices. We quote Plain Wire, $1.75, base, for Nos. 6 to 9 in carloads to jobbers, $1.80 in carloads to retailers and $1.90 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14 and 60 cents extra for Nos. 15 and 16.

Brass and Copper.—A reduction of about 4 per cent. in prices has been determined upon by the manufacturers of Brass in Sheets and Rolls, Brass Wire and Rods and Brazed Tubing. Sheet Copper remains unchanged.

Sheet Zinc.—Under date, December 1, the manufacturers of Sheet Zinc announce a base price of $6.25 per 100 pounds, delivered free on board cars, La Salle, in 600-pound casks, of the thicknesses from Nos. 9 to 22 inclusive, and of the widths from 32 to 60 inches inclusive, and of the lengths from 84 to 96 inches inclusive. The following discounts are given:

	Cash with order. Per cent.	Quantity. Per cent.	Total. Per cent.
Carload lots	3	5	8
9000-pound lots	3	3	6
6000-pound lots	3	2	5
3000-pound lots	3	1	4
Less than 3000 pounds	3	0	3

Hollow Augers, &c.—C. B. Hibbard Mfg. Company, Grand Rapids, Mich., announce the following prices on Hollow Augers, Spoke Shaves and Spoke Pointers:

Adjustable Hollow Augers, each	$2.55
Double Spoke Shaves, No. 2, per dozen, net	3.00
Single Spoke Shaves, No. 3, per dozen	1.50
Spoke Pointers, Nos. 1, 1½, 2, per dozen	4.00 to 10.00

Cordage.—The Rope market is quiet because of the season, also because the unsettled condition of the fiber market influences buyers to hold off until they actually need Rope. Manila Rope is quoted at 11½ cents per pound on the basis of 7-16 inch diameter and larger. Sisal Rope, on the same basis, is quoted at 8½ to 9½ cents, according to quantity.

Glass.—The annual meeting of the National Window Glass Jobbers' Association is being held as we go to press. The matter of accepting the proposition of the combined manufacturers is under discussion, with some prospect of favorable action. It is understood that some of the jobbers of the association are not entirely satisfied with all the details of the proposition. If an agreement is reached it is expected that jobbers will advance prices. If, on the other hand, a satisfactory understanding among the jobbers is not arrived at the future of the market is uncertain. At present the local market is weak, and for small lots from store 90 per cent. discount is freely given. Some Western jobbers are quoting Glass for shipment February 1, f.o.b. store, at 90 and 5 per cent. discount, with price guaranteed against decline to date of shipment.

Oils.—*Linseed Oil.*—The market continues dull and uninteresting. The local demand for small lots is limited, and crushers are not offering futures. The market is firm in view of the possibility of an advance, but large buyers are indifferent and are looking for lower prices after the first of the year. It is understood that crushers are busy accumulating stocks. City Raw is quoted, according to quantity, from 46 to 47 cents per gallon. State and Western brands are quoted, on the same basis, from 45 to 47 cents per gallon.

Spirits Turpentine.—The market fell off ½ cent, owing to weakness in the Savannah market, since which time values advanced to former quotations. A firm tone has prevailed, with a fairly active demand at the reduced prices. Quotations, according to quantity, are as follows: Southerns, 53½ to 54 cents; machine made barrels, 54 to 54½ cents per gallon.

Correspondence.

American Hardware Manufacturers' Association.

To the Editor: The communication in *The Iron Age* under date of December 4, signed by "Wires," was without doubt interesting to the members of the Manufacturers' Association. Speaking from the standpoint of a member, I would say at first glance that "Wires," if a member, is certainly not a well informed one, as he does not seem to understand the workings of the association. A little enlightenment, therefore, will do him no harm, and possibly may be of benefit to him.

He states in the article aforesaid that "the meetings thus far held have been little more than what might be called junketing trips." If this be so, then does he also accuse our friends, the jobbers, of participation in the same, for it is a well-known fact that during every executive session of the Jobbers' Association the manufacturers also held a session, and more, the two associations inaugurated at New Orleans the system of holding joint sessions at which questions of mutual interest could be discussed.

Both in private conversation and in public speech in convention the jobbers have congratulated the manufacturers upon their organization, for the reason that it is very apparent that both bodies are getting closer together, and, as a natural consequence, beneficial results will follow.

The Manufacturers' Association is but one year old, and the present membership embraces 180 firms, these being the leaders in their different lines. Formerly, and before the advent of the manufacturers' organization, it was very hard indeed for the jobbers to get a proper attendance of their members at their executive sessions, and some of the individual manufacturers may have been responsible for this. Now, by reason of both associations going into executive session at the same hour, it is a matter of congratulation that there is better attendance for the transaction of business. If, therefore, the manufacturers work while the jobbers are working, in what way can it be inferred that attendance at these conventions is a "junketing trip?"

Some serious matters were considered by both associations at the New Orleans convention last month, and it is unfortunate indeed that my friend "Wires" was not present. Had he been, I am sure, he would not have written as he did. Any of his friends who were in attendance can certainly acquit our association of any such charge as that of a "junketing trip."

I might further say to him, and my friend, R. R. Williams, of your valued paper, who was present, can substantiate this, that all the entertainments, with one exception, which were tendered to the gentlemen and their ladies at the New Orleans convention, were given by the jobbing trade of New Orleans and their local friends. The one exception was the banquet on Friday evening, which was given by the individual manufacturers present (not by our Manufacturers' Association). This latter was a pleasant and orderly affair, as were all the entertainments on the programme. With the exception of the afternoon boat ride to the sugar plantation, tendered by our New Orleans jobbing friends, all functions were in the evening. It was, in fact, a matter of criticism by a few that there was too much work and not enough pleasure, and yet we are accused of going on "junketing trips." This is, to say the least, a harsh criticism on the many hard headed business men who compose the association. My dear friend, do you suppose for a moment that such men would allow themselves to be parties to any such tomfoolery which could be vocabularized as "junketing?" I take it that, not being present, you have judged without proper investigation. Can you not be less severe in your criticism and lend us your presence at our meetings, and help in the work that is to be done?

You speak of holding meetings at different locations from the jobbers, and state that "none but the larger and more wealthy concerns could afford to send representatives such a distance." You strike here, I might say, at the very "soul of our existence." If there is one thing that we must do, one thing of essential importance, it is that we should meet at the same time and place as do the National and Southern Jobbers' Associations. The matter of expense! Do you gain or lose by coming in contact with the large jobbers of the country, or is your acquaintance only with the retail trade? One fare from all points for the round trip, and once there ordinary expenses. If we met at a separate place, would we be assured of a good attendance? Certainly not. Will not a manufacturer go out of his way to meet his friend, the jobber? Do not the jobbers attend their own conventions in large numbers, feeling sure that their warm friends among the manufacturers will also be there to welcome them? And besides, when we do meet, you can be assured that we not only work hard, but we are in position where we can when necessary get in joint session on important matters. Come to the next meeting, dear brother, and help along in the work. There is work for all, as has been stated, and at our meetings suggestions are welcomed from all.

VERITAS.

American Anvils in South Africa.

To the Editor: In your "British Letter" in the current number of *The Iron Age* your correspondent quotes from a report by the committee appointed by the National Industrial Association of England to investigate the commercial prospects in South Africa an article with refence to Anvils.

In view of the very great success that we have had in this market, we feel that we can, with authority, deny the statements made by the English committee.

The English Anvil manufacturers were in full possession of the American market until within about eight years ago. Since then, the home product has practically driven the foreign article out of this country, there being to-day relatively few Anvils imported. Not only has the American Anvil been successful at home, but it has met with equal success abroad.

About four years ago we made our first shipment to South Africa and Australia, and since then our sales have shown satisfactory increase. The market for Anvils in both of these countries is very limited, and we are satisfied that we are receiving our proportion of the business, notwithstanding the fact that we have to overcome a very strong prejudice.

The English committee state that recent importations of Anvils into that country have turned out more unsatisfactorily than ever. As regards this statement, we wish to say that we have not had one single complaint as to the quality of the Anvils that we have shipped; on the other hand, our Anvils have been highly praised, both as to general appearance and wearing quality.

The best proof, however, of the fact that our Anvils are giving satisfaction in these countries is the continued receipt of orders from the same customers.

THE HAY-BUDDEN MFG. COMPANY.

BROOKLYN, N. Y., December 5, 1902.

PAINTS AND HARDWARE.

THE following letter from a New England merchant, describing his experience with the sale of Paints, will be of special interest to those who are considering the advisability of adding this line to their stock:

I have read with a great deal of interest the extracts from letters received by you, and which have appeared in *The Iron Age*, in regard to Paints in the Hardware store, and I wish to say that from my point of view a Hardware store is the proper place for Paints to be sold unless it be in a regular Paint store.

I have come to believe that Hardware and Paints go hand in hand together, and especially if Builders' Hardware is sold, but in my case that has not helped me out to any great extend as I have not catered to the builders for the past 16 years.

ATTRACTED NEW CUSTOMERS.

About three years ago I was persuaded to put in one of the best lines of Paint on the market, and by the proper use of their liberal advertising matter and methods and keeping everlastingly at it myself I have established a Paint business that I am proud of, as I have sold over two carloads this year up to date. By the sale of Paint many new customers have been brought to my store that were never there before, on account of which my regular business has been increased.

A FIRST-CLASS ARTICLE.

This has been brought about by selling a first-class article, as pleased customers are always sure to tell some one else, and so it keeps going on and on like an endless chain, and there is no end to the possibilities that can be reached by selling a line of first-class Paint in connection with an equally good line of Hardware, as each helps the sale of the other, and the Paint end of the business if properly handled is certainly a profitable end.

I would certainly advise all Hardware dealers who have not already done so to put in a line of Paints, and do it now.

ACQUIRING WOOD SCREW PLANTS.

AMERICAN SCREW COMPANY, Providence, R. I., have purchased the Wood Screw plants of the Massachusetts Screw Company, Holyoke, Mass., the Boston Screw Company, Fitchburg, Mass.; the Wright & Colton Wire Cloth Company, Worcester, Mass., and the T. C. Richards Hardware Company, West Winsted, Conn. The Fitchburg plant continues as heretofore, but the machinery, &c., constituting the other purchases will be removed to Providence in due time.

HAWKES-JACKSON COMPANY, 82 Duane street, New York, manufacturers of what they trade-mark Solidhed Specialties, such as Thumb Tacks, Numbered Screen Tacks, Paper Fasteners, Eyelets and Special Eyelet Pliers for eyeleting papers, fabrics, &c., are sending gratuitously on request, to dealers interested, an attractive buff colored hanger sample card, tastefully gotten up, 11 x 5 inches, with a piccaninny (solid) head above and a dozen Brass Head Bevel Edge Thumb Tacks underneath to catch the customer's eye.

THE VALUE OF COURTESY.

THE following comments on the value of courtesy are from a recent issue of *The Corbin*, under the *nom de plume*, "The Man in the Corner:"

Courtesy—not mere politeness, but that habit of mind which causes a man to put himself in the other fellow's place and give his ideas and feelings consideration—is an attribute well worthy of cultivation by a young business man. In this age, when the old fashioned deference to our elders is replaced by the encouraged self assertion of the young people for whom we live, we are more simple and direct in our thought and speech, and manners more clearly show forth the man. It is therefore all the more necessary that the man should have social qualities worthy of exhibition and that he should cultivate a kindliness and sincerity of thought that will find fitting expression in a straightforward, frank and manly bearing.

The habit of courtesy is of commercial value wherever in business a man comes in contact with his fellows. It is the pleasant man, the fair man, the man whose manner betokens a self respect and an appreciation of the desires of others, who is remembered, spoken well of and sought again. Many a transaction has been brought to a successful issue by the exercise of a tactful courtesy, which, without it, could never have been consummated. Many a lawsuit has been caused by the want of it; friends made enemies and business ruined, all because on one side or the other there was some one without this saving grace.

Particularly is courtesy of value in a retail store. Listen to a woman talking of her shopping and you will find that the service given in the different stores is in her eyes of equal importance with the quality and the price of the goods. It is the nice girl in the china store to whom she recommends her friends. The linen clerk who knows the latest wrinkles in napery gets her trade. The dry goods clerk who assists her in her little economies, sells her all she buys in his line, and the furniture man who gave her a private view of a rare rug and discussed furnishings with her when he knew she did not care to buy, will be given the order for the new chamber suite when it is bought. Think over the stores where you do your own trading and analyze the reasons for buying there, and you will find that you are influenced by much the same motives and that the personal element cuts a large figure in your purchases.

It is not only the customer who places a proper value upon courtesy. Every merchant weighs carefully and anxiously the qualities of his employees and among the time servers whom he must regard as a poor investment, the courteous, attentive, diligent man shines forth a jewel. Go into a store and tell the proprietor what you want and see him turn to his clerks and after studying them a moment select one to wait upon you. Every time that he does this his clerks are mentally weighed in the balance, and it is the man with business tact and ability, careful of your wishes and his interests, to whom he intrusts his best customers and most profitable trade, and upon whom his eye rests with the liveliest satisfaction. It is he to whom it is safe to show favor, and if the work given to him is harder than to his fellows it is but an indication of his employer's confidence in his ability, which sooner or later will find a satisfactory expression. How many, many of the junior members of large firms have made headway simply because by their courteous treatment of customers they made themselves so well and favorably known as to be indispensable.

I think there must be in the hereafter a special place of punishment for the careless, heedless, indifferent, selfish employees of men who have had to depend upon their assistants for success. What plans have failed through their poor service! What projects were never attempted because of the knowledge that the man who would do the work could not be depended upon! What waste is daily going on all over the country because the employeees do not feel and act in accord with the employer's interests!

In every walk of life "doctor, lawyer, merchant, chief, rich man, poor man, beggar man" and all the rest, this trait of courtesy—seeking to please others—leads to better things. With it a man is able to show his ability to the best advantage. Without it, he is as one who sits in his own light and his good qualities are imperfectly seen.

It is the outward expression of an inner quality well worthy of careful cultivation.

A FEW SUGGESTIONS TO HARDWARE CLERKS.

BY F. I.

THE success of the Hardware store depends in no small measure upon the *personnel* of the employees in that store. Many a merchant can attribute much of his success to the efforts of the man behind the counter. Many a lad starting a business career as errand boy has in time become manager and proprietor simply by hard work and close attention to business. Illustrations of these self made men are seen in every branch of the mercantile business. The future offers as great a chance as has the past, and it depends on the clerk alone whether or not he will always be behind the counter.

No retail business requires more intelligent salesmen than does Hardware. Courtesy, thoughtfulness and intelligence are needed in the clerk of any store, but in no salesman are they as essential as in the employee of the Hardware store; and nowhere will these requirements, together with honesty and hard work, count for more than in this business. Generally when a clerk fails to be promoted he has failed to earn promotion—in fact, does not earn the salary he gets. And right here is a never failing recipe for a raise in salary: Work as though you were being paid twice the wages you are getting—be worth to your employer twice as much as you are getting, and it will be only a question of a short time before you'll get what you are earning, will get it from your present employer or from another.

Never be idle. There is not a Hardware store in the United States where there is nothing to be done. And this is just the reason why I say the Hardware store offers such opportunities to the fellow who is willing to work and wants to learn. No matter what you may be doing, never forget that the most important thing is to sell and to show your goods. Do not let a customer wait; a half minute waiting in a store for a clerk to come forward seems a longer time to the customer than waiting ten minutes for a street car. Take pains to show a customer any goods that he may even ask about. Let him see that you are not lazy and that you desire to please him. Meet every customer in a pleasant way, no matter how unpleasant you may feel. Clerking in a Hardware store is a good occupation in which to learn and develop self control, and having self control has made some men rich.

When a clerk begins to think he is worth more than he is being paid, if he is sour on his job, the best thing he can do is to get out before he is kicked out. It is uphill work for a clerk to succeed who is constantly watching the clock, who is ever worrying about being late for his meals or is afraid of working overtime. Always be ready to work and to think about things in the store, and endeavor to display goods attractively. If after a few years promotion comes and you step forward ahead of some other employees, be very careful about the swelled head. Do not get to thinking that you have learned the Hardware business—that will take a life time—and never grumble against your employer. Sometimes his way may not seem like the right way, but generally it is true that his longer experiences have taught him lessons that you have yet to learn.

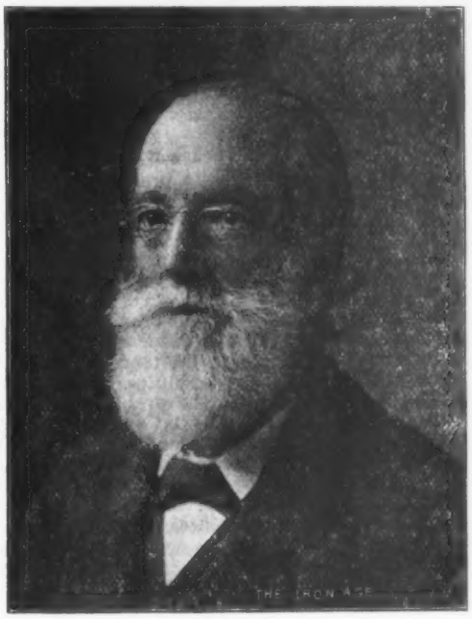
Above all, be honest—honest with your employer, honest with the customer, and honest with yourself.

The Dooley-Ayers-Raisbeck Company, wholesale and retail dealers in Agricultural Implements, Bloomington, Ill., are erecting a new warehouse and office building, which is expected to be ready for occupancy by January 1 or 15.

ROBERT BIDDLE.

ROBERT BIDDLE, a member of the old and well-known Biddle family of Philadelphia and one of the founders of the Biddle Hardware Company, died December 3, at his home in Riverton, N. J., in the suburbs of Philadelphia. Mr. Biddle was also one of the founders of this charming suburb, where he lived surrounded by his children and grandchildren, a personal exemplification of some good Philadelphia traits, honored for his high character and esteemed for his many kindly and attractive personal qualities.

In 1837 the brothers, Robert and Wm. C. Biddle, started the business since known as Biddle Hardware Company, but which was then called R. & W. C. Biddle. In 1872, when only 58 years of age, Robert Biddle felt able to retire from business, and determined to free his mind from further business cares, and handed the



ROBERT BIDDLE.

business over to his son, Charles M. Biddle, who has since been the head of the house.

Robert Biddle, who was a man of quiet and refined tastes, then traveled extensively throughout our own country and also in Algiers, Egypt and the South of France. He made a practice of spending his winters in the South or abroad, and his summers at his home in Riverton. In his personal life he was known as a man of strict old fashioned honor and integrity, and of kind and thoughtful disposition, which made for him many friends, not only among the Society of Friends, but also among his business and social acquaintances. He is survived by his two married daughters and his son, Charles M. Biddle.

NEW FACTORY OF MILLER & VAN WINKLE.

MILLER & VAN WINKLE, 18-24 Bridge street, Brooklyn, N. Y., have recently completed the erection of a fine new brick factory building of approved modern mill construction, adjoining the older building on a portion of the same site, which has a total frontage of 100 feet on Bridge street and 90 feet on John street. The new building has four stories and basement, each of which is 46 x 82 feet. A new Corliss engine and boiler have been installed in the cemented basement, while the japanning ovens, also new, are of much greater capacity. In the basement are coal bunkers, a well, from which to obtain a water supply for factory purposes, tank, &c. The upper floors are supported by heavy wooden beams and have 4-inch floors. There are two elevators for carrying freight, and it is planned to install a dynamo for lighting the factory in the near future. The first floor is divided between a fine large office, 33 feet square, finished natural in pitch pine; shipping department and work rooms. The business is carried on by W. H. Miller, the surviving partner, who has had 38 years' practical experience, and two sons. Mr. Miller is a director of the Manufacturers' Association of New York, and a veteran of the Civil War. Particular attention is given to quality, all kinds of Tempered Springs being manufactured from round and flat wire, including those for machinery, agricultural implement, furniture and electrical purposes, as well as special Springs of any character from specifications furnished. They also manufacture largely Tempered Wire and Flat Steel.

SIMONDS MFG. COMPANY.

THE SIMONDS MFG. COMPANY, Fitchburg, Mass., and 40 Murray street, New York, have dressed the front show window of their New York branch in a very attractive manner, showing not only their Standard Saws, made for many years, but a full line of their Hand Saws in Rip, Cross Cut, Compass, &c., which is a comparatively new feature with them. In the same window are the original medals awarded their products in different world's fairs, &c., including the Grand Prix, a gold medal given by the Paris Exposition of 1900; two medals from the Philadelphia expositions, two from Atlanta, one each from New Orleans, Chicago, 1893; San Francisco, and Melbourne, Australia. Another interesting exhibit is a small antique oak frame, 32 x 26½ inches outside, in which, mounted on a velvet surface, 18 x 24 inches, are perfect miniature examples of Cross Cut, Hand, Circular, Shingle, Gang, Key Hole, Grooving and Inserted Point, Buck, Compass, Drag, Mulay and Mill Cross Cut Saws; Planer and Molding Knives and Saw Makers' Straight Edges and Hammers. All the different patterns of teeth are worked out to a minute scale as accurately as in the regular goods.

MAINE MFG. COMPANY.

MAINE MFG. COMPANY, Nashua, N. H., have just issued their catalogue of White Mountain Refrigerators for the season of 1903. The catalogue is of a unique character and attractively printed. The text is presented in the form of a running story, and with the illustrations of the company's extensive line of Refrigerators, which are on a smaller scale than usual, are a number of views of picturesque White Mountain scenery.

REQUESTS FOR INFORMATION.

Referred to Our Readers:

A correspondent desires to know the address of the manufacturer of the Johnson Wood Frame Wagon Jacks.

An export house inquire for the address of the Michael Mfg. Company, makers of Swings.

REQUEST FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

Phillips Hardware Company, Cambridge, Md., will open up in the retail business on January 1. They will carry a line of General Hardware, Stoves, Tinware, Paints, Oils and Varnish, Farming Implements, Buggies, Wagons, &c., and request catalogues, price-lists, &c., pertaining thereto.

FERRIS CLEVIS COMPANY, Oshkosh, Wis., are building their own plant for the manufacture of their line of clevises, and expect to have it in operation by January 1. At that time they will issue some new printed matter relating to the clevises, of which about 30 different styles will then be made. The company refer to the fact that they are the only concern exclusively making clevises.

TRADE ITEMS.

U. T. HUNGERFORD BRASS & COPPER COMPANY, 497-503 Pearl street, New York, have recently received some large orders for Brass and Copper material to be used for United States Government work, in the schedules of which as leading items are Seamless Brass Condenser Tubes, Seamless Copper Pipe, Tobin Bronze and Naval Brass Rods, Sheet Copper, Muntz Metal Condenser Heads, &c. This company are now fairly settled in their fine new building, which also covers from 35-43 Park street, but notwithstanding their greatly increased accommodations are still short of room, which they hope to remedy when another new and adjoining building on the Park street side, now being erected, is completed.

A UNIQUE souvenir catalogue, entitled "Our Growth," has been issued by the Hockaday Hardware Company, Wichita, Kan. The cover of the catalogue is graced by the portrait of "Kanokla," an Indian chief identified with the early history of Kansas. The Hockaday Company began business on April 1, 1899, at which time they had a floor space of 26,000 square feet and a force of 15. To-day the company own and are occupying an establishment with a floor space of 85,000 square feet, with all modern conveniences and equipment facilitating the storing and shipment of Hardware of all kinds. The local force has been increased to 35, and there are now eight traveling salesmen on the road, whereas three years ago but three were employed. The souvenir is made up of a series of photographic views of the new plant and of the officials and traveling force.

C. K. HAWKS, representative of the Philadelphia Lawn Mower Company, Philadelphia, Pa., is now on his way back from a two months' business trip to California and the coast trade. Mr. Hawks is a son of W. K. Hawks, manager of sales of the company, and his trip, we understand, has been a most successful one, especially in view of his brief experience of one year in the company's service.

THE KENTUCKY CHAIN COMPANY, Frankfort, Ky., have recently completed a commodious plant, which is thoroughly equipped with new and modern machinery, and are fully prepared to fill orders promptly and cheaply. In their new catalogue, which was noticed several weeks since, they give full particulars as to sizes, weights, &c., and in a manner, they state, which will be found convenient to buyers and salesmen.

SCHATT & MORGAN COMPANY, successors to New York Cutlery Company, Gowanda, N. Y., who are soon to remove to Titusville, Pa., are using a unique and effective business card, on the back of which is a reduced reproduction of the large inset issued with *The Iron Age* several months since, giving portraits of the delegates to the convention of the National Retail Hardware Dealers' Association held in Chicago last March. In looking over the portraits Mr. Schatt states that he "discovered that over 80 per cent. were personal friends and customers, and knowing that the Hardware trade generally were subscribers to *The Iron Age*, and thus had all received this group of portraits," the company concluded that a business card with reproduction of the group "would be of great advantage to the Schatt & Morgan Company."

UNDER date of December 1 W. F. Remppis announces that he has acquired the entire plant and business of the Reading Standard Mfg. Company, Reading, Pa., and will continue under the name of Reading Standard Cycle Mfg. Company. Mr. Remppis, who was secretary and general manager of the former company for a number of years, states that he is now engaged on Reading Standard Models for 1903, and in the course of a few weeks they will be ready for the trade. It is intimated that nothing but the highest grade of material will enter into the construction of the 1903 Models.

THE EMMERT MFG. COMPANY, Waynesboro, Pa., held their annual meeting on December 4. It was reported that the business of the year had been especially gratifying, having increased fivefold as compared with the previous year. All the old officers were re-elected with the exception of one director who retired voluntarily. It is contemplated to build an additional machine shop and foundry in the spring.

THE second annual Automobile and Sportsmen's Show, under the auspices of the Tri-State Automobile and Sporting Goods Association, will be held in the Light Guard Armory, Detroit, Mich., February 9-14, inclusive, 1903. Among the features of the approaching exhibition will be Rifle and Revolver competitions, Automobile speed tests on the speedonome; bench show for hunting dogs and a splendid display by the Fish Commission. During the week of the show a live bird and inanimate target tournament will be held at the Rusch House Grounds, during which the Western championships at both birds and blue rocks will be shot. Applications for space at the show should be addressed to Seneca G. Lewis, secretary-treasurer, Post Office Box No. 5, Detroit.

EXTENDING THE HARDWARE LINE.

BUTLER BROS., New York, Chicago and St. Louis, who sell to merchants exclusively, issue an interesting folder especially addressed to the Hardwareman, in which the propriety and necessity of adding to the lines handled by him is forcibly presented. We make the following extracts from their "Heart to Heart Talk with Hardwaremen":

It is only natural to suppose that you are anxious to make the most possible out of your business. The question "How shall I do it?" is a very important one. It is one that perplexes the jobber as well as the retailer. It is one that we have answered for ourselves once in one way and again in another. It is one that must be answered differently at different times, for as conditions change, answers to the problem also change.

At this time the answer may be summed up in one word "Consolidation." The tendency of the age is toward concentration and departmentization. We see this tendency exhibited in every phase of the commercial world. It is making itself felt in the form of trusts, limited corporations and syndicates. These combines are gigantic factors in the business world and the masses are beginning to recognize their influence and are adjusting themselves to the changed conditions they enforce.

The change has not affected the money class alone. It has permeated the entire commercial structure. To give money and labor its greatest earning capacity and do away with every useless expense has been made necessary by the fierce competition which has been the cause of this change. The Hardware merchant has been forced to shift his position to other and safer grounds. He has been compelled to consolidate, to make his store a collection of stores, to utilize all possible waste and stop all possible leakage. Those that have done this have succeeded; those that have not, have either failed or are slowly arriving at the place where failure awaits them.

We believe we have reached the point in our commercial progress where it is impossible for a straight Hardware store to make a marked success. The changed conditions, above referred to, make such a success impossible. The public is rapidly being educated into the department store idea. It goes where it can buy the most economically. The time is rapidly coming when the housewife will refuse to go to one store for a Tin Pan, to another for a Lamp, to another for a China Plate, to another for a Tea Kettle, and to still another for her child's toys. She will go to one store where she can buy them all at a saving of both time and trouble and where they can be sold cheaper because they are sold more economically.

The one-line Hardware store expends just as much for clerk hire, rent and miscellaneous expenses as does the Hardware department store and it must have many more customers to do the same volume of business. When a customer is once in the store she will purchase all her needs there if she can get them and if other things are equal, and it will take but little more expense in clerk hire to sell her $2.00 worth of merchandise than it will to sell her $1.00 worth.

The company enumerate a number of lines which, in their estimation, might advantageously be taken up by Hardwaremen. Among these are Baby Carriages, Trunks and Bags, Woodenware, Brushes, Sporting Goods, Furniture, Smokers' Goods, Toys, Horse Goods, Lamp Goods, Sewing Machines, Glassware, &c.

NOTES ON FOREIGN TRADE.

BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE, NORFOLK ST., LONDON, W. C., Nov. 29, 1902.

The Week's Hardware Trade.

IT is still the same old cry. Where trade is good in volume it is unremunerative, and overtime is being worked in two or three sections, but without much financial advantage to manufacturers. This remark applies with equal force to Birmingham, Wolverhampton and Sheffield. In Sheffield one or two Cutlery lines are busy, but taking the trade as a whole it is distinctly depressed. During the week a fair number of orders have come in from travelers, but they are small and carry but little profit. The downward tendency of copper and silver is having an adverse influence upon the industries affected. Among the lines for which there is a fair demand may be mentioned Brass and Copper Tubes, Chandeliers, Gas Fittings, Table Lamps, Curbs and Fenders. Carriage and Shop Lamps are in good request and the Lock and Hinge trades are good, notwithstanding the strike. Plantation Hoes, Edged Tools and Horticultural Implements are in good favor for export. Overseas orders during the week have come mainly from Australia, New Zealand and South Africa. Japan and other Eastern countries are, however, showing distinct improvement in their orders, and South America is showing greater financial stability than it has done for some time past. Trade with New Zealand continues steady and profitable, and while the bulk of orders coming from Australia may be deemed satisfactory, yet they come in streaks and there are still districts in Australia where trade is distinctly disappointing. The Mayor of Wolverhampton has forwarded a letter to the secretaries of both employers and workmen in the Lock trade, offering his good offices as conciliator or in any other capacity.

Hammers.

My last letter was devoted to the prospects for trade in South Africa, and the report made by T. Nicol Jenkin, who was one of the two gentlemen appointed by the National Industrial Association to visit South Africa and prepare a report for the guidance of British exporters. Referring to Hammers the commissioner states that the Hammer trade in South Africa seems to have become in great measure American; nor is he surprised. In every store where the comparison was made of an English and an American Hammer the disadvantage, often to a serious extent, lay with the English. The American Hammer is altogether more showy; the quality may or may not be the same, but the customer appears at any rate to be getting more value for his money. The storekeeper of a South African store was enthusiastic, particularly in regard to a popular nail holder adze eye Hammer bearing the label of the Henry Cheney Hammer Company. The turn down claw of this Hammer makes Nail extraction easy. The storekeeper remarked that he was clearing out the English Hammers at 1 shilling each below cost. The American Hammer only cost 2 shillings. In Maritzburg 12 American Hammers are sold to one British. All the American Tools are labeled and nicely packed, which materially helps the sale. In the report there are some excellent illustrations of Hammers in use in South Africa, all carrying the Henry Cheney label.

Lamps.

Lamps are to be found in practically every dwelling house in South Africa. Here and there the electric light is installed, but this is merely a case of requiring fewer Lamps. Speaking generally, the Lamp is the light giver, and in consequence the Lamp trade is a big one. The Commissioner says: "I regret to say it is in the hands of American and German manufacturers." A Cape Town clergyman called at all the shops in his neighborhood in Cape Town, and was unable to purchase two English Lamps. The same story is told of Johannesburg; they are all American or German. It is generally believed that the American and German Lamps give a better light than the English, and are distinctly cheaper. One dealer produces some English Lamps with German fonts. Another merchant said that the illuminating power of the American Gloria and Rochester were much superior to any British makes, and he was obliged by trade requirements to stock them. The fittings of the British Hanging Lamps, although very good and handsome, are too heavy and expensive. The manager of a firm doing a large trade with country folks said that his Lamps were mainly American. His favor was the American, Edward Miller & Co., who have a special burner of high power and clever attachments, which give them a great advantage. A Lamp dealer in Maritzburg states that some time ago he purchased a lot of expensive Brass Lamps in England. The Lamps could easily have been taken to pieces, but they were packed as they stood, and instead of the freight cost being 40 per cent. it was 100 per cent., while several of the Lamps were broken. At the same time he received a consignment of German Lamps packed with judgment and with corresponding saving in freight. The Lamp chimneys are mainly German, but America has a good share. The Germans pack the chimneys in cases, the Americans in barrels, beginning with a layer round the sides and then working in circles to the center. In globes Great Britain has the best of it.

Prepare for the Future.

There are numerous other interesting comments in these two volumes, to which I must come back at some future time, particularly matters relating to Agricultural Implements, to shipping and to the methods of trade which obtain generally throughout South Africa. One little extract I must make because it shows how well organized and equipped the South African store ma ybe. It is a little sketch of such:

> The African store as kept by the large merchant is admirably complete and self contained. This is essential, for supplies cannot be quickly obtained as is the case at home. All ordinary and most extraordinary demands must be foreseen and provided for. The stores are on the whole splendidly organized. It was a matter of complaint that people called and asked the busy merchants to push some special lines of their goods, not considering for a moment that the merchant's stock contained thousands of different articles. Speaking of this a leading importer said: "The best way for a new firm to enter the market is to study local conditions, make the best possible article, and sell it at a little lower price than obtains."

In conclusion, I would make but two comments. In the first place American exporters who do not procure this report on South Africa will be minus a vast deal of trade information which must sooner or later prove useful to them. The book, on the whole, is well written. Doubtless with a little more time it could have been set out rather more attractively, but as it is I regard it as quite the best report on South African trade that I have seen. My second comment relates to American methods of doing trade in South Africa. It is notoriously the happy hunting ground of the American commission agent. I have no word of complaint to make on this head, for it is perfectly clear he has done his work effectively. But trade cannot forever be held by commission agents in a large and potentially wealthy country like South Africa. Would it not be well, therefore, for Americans who seek to secure South African trade, now that they are at the parting of the ways, to get into much more direct relation with their customers than hitherto?

File Cutting by Hand.

Another nail has been driven into the Hand Cutting File industry by the Home Office, which has now declared the process of File cutting by hand to be dangerous. The Secretary of State has taken this step for the following reasons:

1. It has been shown conclusively that File cutting by hand in the circumstances which actually prevail is extremely injurious to the health of the workers. The tables published by the Registrar-General show that of all processes carried on in factories and workshops in the United Kingdom, File cutting is that which had the highest mortality figure in the ten years 1891-1900.

and that the number of deaths from lead poisoning was more than four times as great in proportion to the number of persons employed as in earthen ware and china works.

2. The matter was inquired into in the years 1897-1898 by the Committee on Dangerous Trades, which reported strongly in favor of the establishment of regulations.

3. The matter has been recently brought prominently before him by the local authority of Sheffield. A deputation from the Health Committee of the City Council attended at the Home Office and strongly urged the establishment of regulations in File cutters' shops in that city in the interest of the health of the workers.

A Novel Trade Combine.

On the authority of the Birmingham correspondent of "Commercial Intelligence," I transmit the statement that a new trade combine, allying the interests of the Hardware, furnishing and metal manufactures, has been formed by the registration of a limited company a few days ago of the Wholesale Traders' Association. The association proposes not so much to earn profits for its shareholders as to safeguard the interests of its members, and to "promote and extend the business and commerce" of wholesale firms in the Hardware, furnishing and metal lines. The offices of the association are at Birmingham. The association was really established so long ago as 1880 for these purposes, and it is now the recognized organization of the trades with which it is mainly concerned. It is in order still further to develop the association's operations and to extend its area of usefulness that it has just been incorporated as a limited company. Two committees of traders will assist the directorate, one an insolvency, the other a General Trades Purposes Committee. The Insolvency Committee will look into "long firm" cases and other instances of fraudulent trading, and also deal with the conduct of the realization of insolvent estates. The Trades Purposes Committee will seek the promotion of or offer opposition to any parliamentary measures affecting the Hardware, metal and furnishing trades. The railway rates controversy, for instance, supplies a trade organization with plenty of scope for energetic action. The association disclaims any encroachment upon the aims and duties of Chambers of Commerce. So far from this it looks to assisting these bodies. The secretary of the association points out that the traders have already been the means for bringing together four or five Midland Chambers of Commerce in concerted action on the railway rates question. The development of the association upon the new lines is anticipated to bear beneficial results to the allied trades concerned, not the least of these being the adjustment by arbitration of many differences which otherwise involve heavy expenses at law. Some of the larger firms directly interested are: Cartlands, brass founders, Birmingham; Small Arms Company, Limited, Birmingham; Sutton & Ash's, iron and steel works, Birmingham; Green & Cadbury, Limited, Birmingham, and P. T. Pearson's Hardware manufactory at Old Hill, Staffordshire.

Eight Months' South African Trade.

Following up my comments last week on the trade of South Africa, I am now in possession of the returns for the first eight months of the year of imports into the Transvaal and Cape Colony, and for the first nine months of imports into Natal. The items of interest to Hardware readers are extracted as follows:

Import Trade of the Transvaal (Eight Months).

Articles	Eight months ended Aug. 1901.	Eight months ended Aug. 1902.
Metals and manufactures of (includes Agricultural Implements, Bicycles, Hardware, iron and steel manufactures, Cutlery, machinery &c.)	$545,000	$6,830,000
Wood and manufactures (includes furniture)	80,000	1,285,000
Vehicles (other than Bicycles)	10,000	300,000
Toys and Sporting Goods	5,000	135,000
Unenumerated articles of merchandise	475,000	1,755,000

Imports into Cape Colony.

Metals and manufactures (includes iron, lead, machinery and Hardware)	$5,400,000	$9,560,000
Wood and manufactures of (includes furniture and cabinet ware)	2,565,000	3,810,000
Pipes, iron and earthen	345,000	625,000
Earthen Ware and Crockery	285,000	395,000
Agricultural Implements	230,000	370,000
Paints and Colors	225,000	325,000
Unenumerated articles of merchandise	9,495,000	12,775,000

Imports into Natal.

	Nine months ended September 30, 1901.	1902.
Metals and manufactures of (includes Agricultural Implements, Bicycles, Hardware, iron and steel manufactures, Ironmongery, machinery, Sewing Machines, &c.)	$3,400,000	$5,955,000
Wood and manufactures (includes cabinet ware)	1,040,000	1,505,000
Railway and tramway material	340,000	260,000
Electrical fittings	200,000	190,000
Unenumerated articles of merchandise	3,310,000	5,345,000

Cape Town Industrial Exhibition.

An excellent opportunity for exporters to South Africa should be the South African Industrial Exhibition, to be held at Cape Town from November, 1903, to February, 1904. Two-thirds of the space, it is stated, has already been taken, but I do not doubt that prompt application would render it certain that stands could be secured. The exhibition will be the first held in Cape Town for many years. It was arranged before the war, but naturally had to be abandoned. Next year is regarded as an opportune time for holding it, as by that time it is hoped that South Africa will have entered upon an era of industrial activity. The exhibition will comprise 30 sections, including mining, engineering machinery, railway and motor cars, electricity, smoke abatement, recent inventions, Hardware and Tools.

Harrows for South Africa.

In connection with the reinstatement of Boer farmers the Government of the Transvaal Colony recently sent to the Crown agents for the colonies a request for the supply of several thousands of Harrows. The order was a very urgent one, and as large quantities of Harrows are not stocked by English firms there was a difficulty about early supply. For a large portion of the order the Crown agents have invited tenders in this country, but with a view of meeting pressing needs as far as possible they ordered some 2000 or more Harrows from Canadian firms. United States and Canadian firms of makers usually stock such implements in large quantities, the bringing of great tracts of prairie land under cultivation insuring heavy demands. Thus there will be little difficulty in getting early delivery of a proportion of the Harrows. As the Crown agents are naturally averse to making large purchases without prior inspection, they requested the Dominion Department of Agriculture to appoint an expert to inspect the implements before shipment, and this has accordingly been done.

Prospects in Siam.

Considerable anxiety has been felt here with reference to trade prospects in Siam, in consequence of reported serious disagreements between the French and Siamese governments. Things are settling down now, and so far as I can gather there is no fear of any serious rupture. The British Government is certainly of this opinion, for it is intended very shortly to create a number of British consular posts in the country. The presence of a number of these gentlemen in Siam should lead to increased business.

Concerning Aluminum.

I received a visit this week from a metallurgist who is giving a good deal of time and attention to aluminum. In point of fact he came into the office to look up a number of articles on Alumnium which have appeared in *The Iron Age* at various times, particularly those by Dr. Goldschmidt. He told me, in course of conversation, that he has just heard of what, in his opinion, is likely to prove a perfectly satisfactory solder. I have had so many gentlemen here who tell me that they have discovered the long wanted solder that I smiled a little in-

credulously. He assured me, however, that what he said was true, and is coming up very soon to prove it. If he does I shall not fail to let American readers know of it.

The Supply of Ivory.

One hears a good deal nowadays that celluloid and other substances are to substitute ivory. But the ivory trade is, in many respects, in its infancy. The percentage of slaughtered ivory imported into Europe does not exceed 25 per cent. of the total imports. Ivory has only come into general use in large quantities within the last century, but elephants have been dying for thousands of years, and Europeans are only now finding out and using their tusks. Some of them have, in the meantime, been stored and used by natives in many ways. Even to-day some native chiefs in the interior of Africa possess stockades round their palaces composed of rows of tusks collected when they were of comparatively little value, and they now barter these for the necessaries or luxuries of modern life. Further than this, a considerable number of tusks are shed by elephants every year. Since the opening up of the Congo Free State the Antwerp market has divided the proceeds with London; indeed, recently the imports into Antwerp have exceeded those into London. In regard to price, the finest specially selected pieces for making billiard balls, already partly worked, reach $4 per pound. The highest price for tusks is $3.25 per pound but the average price for best tusks varies from $2 to $2.75. The range of prices 10 to 12 years ago was 40 per cent. higher than to-day, the cause of the decline being due to increased supplies. The American demand for ivory is still very keen. But the broad fact to be noted is that there is plenty of ivory to be obtained as cheap, or cheaper, than any time during the last 30 years.

AUSTRALIAN LETTER.

[FROM A SPECIAL CORRESPONDENT.]

WITH a stagnant market—retrenchment the order of the day with Governments, employers and citizens alike—and the drought the one unfailing topic of conversation, it becomes a task of some small difficulty to write a report calculated to interest the trade in a country which fortunately lacks the truest of sympathy, that of fellow suffering. And yet during the present week Melbourne, the commercial capital of Australia, is arrayed in holiday garb for the annual racing carnival, and a stranger here would see nothing but a prosperous looking city, without any indication of the hardships existing in the back country. The retail trader, however, finds that our country visitors are fewer in number and poorer in pocket than in any former years, and his stock sadly wants turning over. Hand to mouth buying is the order right through, from importer, merchant and retailer to citizen.

Sections Which Have Escaped the Drought.

A few favored parts of the State which have escaped the drought are simply coining money at the expense of the less fortunate. The harvest however is foredoomed to absolute failure, and indeed things are so bad with the farmers that a relief fund started in Melbourne a week or so ago, has claimed much attention and has so far accumulated some £4000.

Relief Fund.

Amongst the principal donors in the Hardware trade of Melbourne the following firms will be known to some of your readers: John Danks & Son, Jas. McEwan & Co., Briscoe & Co., Robison Bros. & Co. (engineers), £50 each; McLean Bros. & Rigg, Morris & Meeks, Thos. McPherson & Son, Harvey Shaw & Co., E. Duckett & Sons, £25 each; with many smaller donations totaling over £500, collected by Henry Meeks (of Morris & Meeks), one of the most highly esteemed traders. The Cycle trade subscribed about £100, through W. E. Canning. The wholesale houses will of course have to nurse country traders' accounts for months and years to come, and will have to stand a heavy financial strain. And these temporary difficulties of ours must of course have a reflex action on American-Australian trade.

German Trade.

From a consular report it appears that German exports of Hardware goods to Australasia during 1901 were as follows: Iron, &c., £400,000; Wire, £195,000; Machinery, £65,000; Crockery, £65,000; Glassware, £30,000; Brushware, £25,000. German's imports from Australasia during the same period were nearly £5,500,000, chiefly wool, but also inclusive of tallow, £100,000; Copper, £70,000; Lead Ore, £850,000; precious stones, £95,000, &c. It is thus evident how good a customer this European country is to us, and it would be an interesting comparison for *The Iron Age* to obtain a similar report anent American trade. Your correspondent has not time to make inquiry before the mail closes, but ventures to think the figures regarding exports from Australia to America would not bear comparison. Our American cousins are enterprising salesmen, but they don't buy from us.

Tariff Decisions.

The following tariff decisions have recently been issued by the Minister of Customs, and will be of interest as affecting lines which we largely obtain from America:

Shot in Cartridges.—Bullets and Slugs are to be treated the same as Shot, but not to affect military Cartridges, which are specially exempt without qualification if n. e. i.

Value of Goods for Import Returns.—Add 10 per cent. on all foreign market values under section 154 of the Customs Act 1901. This should be done in all cases, as it is the customs basis for ascertaining Australian values; but when Australian values are otherwise ascertained, there is, of course, no reason for a further addition of 10 per cent.

Hanging Lamps (not Electrical).—Parts dutiable as follows: Reflector or Shade, 20 per cent; Chimney, 20 per cent.; all other parts, 15 per cent.

Engineers' Studs (as used for clamping pieces of metal together when repairing machinery, consisting of a bolt threaded at both ends and a nut).—12½ per cent.

Molding Machine (known as hammer core, for use in metal working).—12½ per cent.

Straw (used in the packing of goods subject to ad valorem duty).—Duty is to be charged on the value of the straw, if such is not already included in value for duty of goods at same rate as goods contained in the package.

Electrical Appliances.—Electroliers, 12½ per cent.; Fuse Boards of porcelain, wood and metal, free; Lamp Arm Brackets, 12½ per cent.; Lamp Bracket, 12½ per cent.; Lamp Holders, 12½ per cent.; Lamp Reflectors, metal, 12½ per cent.; Lamp Shade Carriers, 12½ per cent.; Lamp Standards for tables, 12½ per cent.; Pendants (as Electroliers), 12½ per cent.; Wood Pushes, 12½ per cent.

Electrical Appliances.—This term is not to be applied to cover telegraph poles, or iron or wood work, such as the brackets used on poles. Insulators used on poles are known as porcelain, and accordingly are admitted free.

Sash Fasteners or Sash Locks.—20 per cent. (Manufactures of metals n. e. i.)

Pruning Shears known as Myticuttah, and Tree Pruning Shears.—12½ per cent. (Horticultural Implements.)

Razor Strop Swivels and Dees and Studs for Leather Pouches (when not attached to dutiable articles).—Free. (Mountings for Leatherware.)

Box Nailing Machine.—12½ per cent (Machines n. e. i.)

Glass Shades (Electric).—20 per cent. (Glassware n. e. i.)

Wood Blocks (with holes bored therein for use in electrical work).—20 per cent. (Articles of wood n. e. i.)

DECISION IN FOREIGN ENAMELED WARE CASE.

THE Board of Reappraisement of the United States General Appraisers has just rendered a decision in the protest cases of Stransky & Co., New York, importers of German Enameled Kitchen Ware and House Furnishing Utensils. The case has attracted attention because of the interest manifested in its outcome by the German Government. Another feature of the dispute is the revelation developed before the board of the struggle for primacy now occurring between American and German Enameled Ware makers for control of the market here. While as is customary in cases before the Board of Appraisement, all information bearing on the case was refused, we are advised that the decision is in the main unfavorable to the claims of Stransky & Co. The board determined the foreign market value of regular Enameled Ware and allowed 5 per cent. to Stransky & Co. on products from certain German factories, it being their opinion that such a reduction was due the importer for taking the ware in an unassorted condi-

tion, known in trade parlance as the "run of the kiln." It is believed Stransky & Co. wanted an allowance of 15 per cent. The "run of the kiln" is interpreted to mean the product as it comes without culling, and naturally includes some seconds. It is believed German importers will not cease their efforts to import German Enameled Ware into this market.

PRICE-LISTS, CIRCULARS, &c.

THE BEALL SHOVEL COMPANY, Alton, Ill.: 1902-1903 illustrated catalogue and price-list relating to high grade Steel Shovels, Spades and Scoops, including both Cleveland or open back and Antrim or plain back Shovels. The catalogue contains a number of half-tone cuts of the goods they manufacture.

R. E. DIETZ COMPANY, New York: Illustrated catalogue devoted to Dietz Tubular Lanterns, Street, Driving, Motor and Bicycle Lamps, Locomotive Headlights, Commercial, Railroad and other Lanterns.

SAWYER TOOL MFG. COMPANY, Fitchburg, Mass.: Leaflets illustrating, with prices, Combination Set No. 35 and Combination Bevel No. 90.

THE ACME MFG. COMPANY, Plantsville, Conn.: Hurwood Tools. A price-list illustrates Screw Drivers, Scratch, Belt, Folding, Thong and Tinners' Awls, Handle Regulators, Screw Driver Bits, Meat Hooks, Ice Picks, &c.

THE JOSEPH DIXON CRUCIBLE COMPANY, Jersey City, N. J.: Dixon Graphite Facings. A pamphlet describes these Facings.

THE ECLIPSE REFRIGERATOR WORKS, Burlington, Vt.: Catalogue for 1903 of the Eclipse Cleanable Dry Air Refrigerator, the line embracing Domestic Refrigerators, with and without water coolers, Grocers' Refrigerators, Ice Chests, &c.

THE GRAND RAPIDS HARDWARE COMPANY, Grand Rapids, Mich.: The Grand Rapids Noiseless All Steel Sash Pulleys. An illustrated catalogue describes six styles of Pulleys, also Triple and Quadruple Bits and Post Boring Machine.

THE STAR BALL RETAINER COMPANY, Lancaster, Pa.: An illustrated catalogue is devoted to descriptions of the Ball Retainer, which is for use in connection with ball bearings of all kinds where a cup and cone are used, as on bicycles, automobiles, carriages, lawn mowers, blowers, &c.

THE NEWTON STEEL WHEEL COMPANY, Kalamazoo, Mich.: Illustrated catalogue devoted to Steel Wheels for solid rubber and cushion tires; also Steel Wheels with steel tires for country roads.

C. B. HIBBARD MFG. COMPANY, Grand Rapids, Mich.: Illustrated price-list relating to Adjustable Hollow Augers, Spoke Pointers, Spoke Shaves and Spoke Tenon Machines.

THE U. S. GUTTA PERCHA PAINT COMPANY, Providence, R. I.: Catalogue devoted to Rice's Twentieth Century Finishes for machinery. Special attention is directed to Rice's Machine Lacquer or Egg Shell Gloss Lacquer, oil proof, which is referred to as new, for giving an attractive finish to machinery.

HOOPES, BRO. & DARLINGTON, West Chester, Pa.: Catalogue and price-list of Carriage and Wagon Wheels.

THE LUTTRELL HARDWARE COMPANY, Brewton, Ala.: Catalogue relating to Tools, Builders' and Shelf Hardware, Paints, Sporting Goods, Cutlery, &c., which they handle at wholesale and retail.

DE HAVEN MFG. COMPANY, 50-54 Columbia Heights, Brooklyn, N. Y.: De Haven's Trojan Bale Tie. This is illustrated and described as being 30 per cent. cheaper than rope.

THE ACORN BRASS MFG. COMPANY, 195 Fulton street, Chicago, Ill.: Doran Lighting System. The system is designed for lighting stores and is referred to as being less expensive illumination than is obtained from gas or electric arc lights. A circular illustrates the Doran Light.

THE VANDERGRIFT MFG. COMPANY, Jamestown, N. Y.: Washing Machines. An illustrated catalogue is devoted to descriptions of their line of Washers, which includes a variety of styles.

THE WAUKESHA MFG. COMPANY, Waukesha, Wis.: Circular illustrating Fagan's Felt Weather Strips and Felt Parting Stop.

EMERSON EDGE TOOL COMPANY, East Lebanon, N. H.: Illustrated price-list of Scythes and Axes.

KENT LUBRICATING COMPANY, Waukesha, Wis.: Pamphlet relating to the Kent Lubricating Compound, Moon, Star and Neverslip Grease Cups. The Lubricating Compound is for use on all classes of machinery for foreign shipment, to prevent rusting from salt air. The company are just commencing the erection of a new factory and as soon as it is finished will be in a position to take prompt care of all orders.

THE PHILADELPHIA LAWN MOWER COMPANY, Philadelphia, Pa.: Annual illustrated catalogue and price-list of the Genuine Philadelphia Lawn Mowers. The catalogue is attractively printed, some of the machines being shown in *fac-simile*. Copies may be obtained on application. The company refer to trade thus far this season as showing an increase over last year.

THE UNITED WIRE & SUPPLY COMPANY, Providence, R. I.: Seamless and Brazed Tubing. A price-list is devoted to Seamless Brass, Low Brass, Copper and Seamless Nickel Silver Tubing; also to Brazed Brass Tubing, Brazed Bonzer Copper, Brazed German Silver, Tapered Tubes and Silver Solder. This company are successors to the Standard Seamless Wire Company and Burdon Wire & Supply Company.

THE RUGG MFG. COMPANY, Greenfield, Mass.: Specialties in wood, including Hand and Drag Rakes, Hoe, Fork and Rake Handles, Snow Shovels, Grocers' Crates, Vine Holders, &c. A catalogue illustrates, with prices, Wood and Steel Snow Shovels, Rakes, Framing Pins and Tomato Vine Holders.

THE MARLIN FIRE ARMS COMPANY, New Haven, Conn.: Circular illustrating their Model 1893 Carbine, Rifle and Take Down Rifle, in connection with their .32-40 High Pressure Smokeless Cartridge. Another circular illustrates the same line of Fire Arms in connection with their .38-55 High Power Smokeless Cartridge.

MORGAN & CORNELL, 213-215 Duane street, New York: Catalogue of Tin Cans, Grocers' Tea, Coffee, Spice Canisters, Bins, Oil Tanks, Tin and Brass Scoops, &c.

C. E. JENNINGS & Co., 101 Reade street, New York: Illustrated descriptive catalogue of 30 pages entirely devoted to Tool Chests, Tool Cabinets and Miter Boxes, showing large assortments of Chests, with and without tools, for both professionals and amateurs, their Chests and Cabinets, however, being intended principally for mechanics.

THE BAIRD HARDWARE COMPANY, Gainesville, Fla.: Wholesale catalogue for the spring of 1903 of Agricultural Implements and Farmers' Supplies.

JOSEPH DIXON CRUCIBLE COMPANY, Jersey City, N. J.: Catalogue and color cards relating to Dixon's Silica Graphite Paint for protecting surfaces subject to a high degree of heat and weather exposure. The Paint is made in four colors.

THE STANDARD HORSE SHOE COMPANY, Boston, Mass: Illustrated catalogue and price-list of Standard Horse and Mule Shoes.

MONARCH REFRIGERATOR WORKS, Burlington, Vt.: Catalogue and price-list for 1903 of the Monarch Cleanable Dry Air Refrigerators, including Family Refrigerators, with oak cases, lined with nickeloid, ash cases, lined with zinc, fancy or plain, &c.; Ice Chests, Sectional Coolers and special work.

IN accordance with a petition signed by a majority of the directors of the Hartford Axle Company, Dunkirk, N. Y., L. N. Murray has been appointed receiver under a $10,000 bond. B. E. Farnham of Dunkirk has been appointed referee to take proofs concerning the corporation's condition and decide whether it shall be dissolved. The hearing before the referee will take place next March.

THE O-RIB-O CLUB.

THE officers and employees of the Briscoe Mfg. Company, Detroit, Mich., have organized a club to be known as the O-Rib-O Club. The name "O-Rib-O" is taken from the name of the special brand of Galvanized Ware made by the company. Officers were elected and 63 names are on the list as charter members. It is hoped that all employees will eventually join. The officers of the company, including President Benjamin Briscoe, Secretary Frank Briscoe and Superintendent Charles Puddefoot, are members of the club on the same basis as any other employee, as it is not organized under the patronage of the company, but is a club formed by and for the employees.

The company have donated the use of the club house at Milwaukee avenue, directly behind the factory. This is a handsome two-story brick house and is being fitted up with all club conveniences, such as reading room, baths, gymnasium, fully equipped kitchen and dining room. Among other features of importance, all club members will probably take their mid-day meal at the club house, running the table on a co-operative plan. Instead of eating a cold lunch seated on benches surrounded by factory dirt, or going into nearby saloons, where they get free lunches and very doubtful liquid refreshments, the employees will be able to get an appetizing hot lunch at cost price. The restaurant was started on a basis of 15 cents for regular dinner, including soup, meat, potatoes, vegetables, coffee and pie. It has been found, however, that the price can be reduced to 12½ cents, and it is hoped soon to get the cost down to 10 cents for a meal. The club also serves single orders, as follows: Coffee, 2 cents; sandwich, 2 cents; pie, 2 cents; soup, 3 cents. Employees who bring their lunch have the privilege of eating it at the club table and may, if they wish, supplement it with hot coffee, soup, &c. So far the meals have been excellent, and the officers of the company and entire force are enthusiastic boarders. This meeting place gives all an opportunity to become acquainted, and from the conversation at the table the officers of the company get many points in regard to the workings of the different departments. The value of this arrangement is obvious. Beside the noonday meal feature, it is expected that the social part of the club will be of considerable importance, as the club house will give the members a chance to become better acquainted at a place where all will meet, not as officer, foreman, employee, &c., but on an equal social footing.

The club was started largely through the efforts of Benjamin Briscoe, the president of the company, and the spontaneous response on the part of the men shows that his efforts toward furthering their comfort were appreciated by them in the same spirit as they were made. The extension of enterprises of this kind on the part of establishments employing a considerable number of men cannot but have excellent results if undertaken in the spirit displayed in this instance.

The formal opening of the club took place on the 3d inst. and was a success in every particular, the members attending in full force with their wives and sweethearts. The programme of the evening was furnished almost entirely by the office and factory employees, and much talent was exhibited. A resolution was passed extending a vote of thanks to a number of concerns and individuals who had made donations to the club.

THE ROCK ISLAND STOVE COMPANY, Kansas City, Mo., announce that their business has grown to such an extent that it has been found necessary to move to 1321 Union, one block west of their old location, where they will be the sole occupants of a large three-story warehouse. It also has been found necessary to increase the number of traveling salesmen from three to four. The company are now in position to supply Southwestern trade with a complete line of Refrigerators, having arranged to sell the Gurney and La Belle lines, made at Fond du Lac, Wis. The Refrigerator business will be transacted under the name of G. W. Blakesley & Co.

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THE TROUT HARDWARE COMPANY.

THE TROUT HARDWARE COMPANY, Chicago, Ill., have been incorporated with a capital stock of $200,000, Geo. W. Trout, S. B. Wilber and J. Murray Hoag being among the incorporators. The company have been organized by the election of Geo. W. Trout, president and treasurer, and S. B. Wilber, secretary. The recent rapid increase in the business of the firm of Geo. W. Trout & Co. made it desirable to incorporate under a broad charter permitting a manufacturing as well as a mercantile business, and facilitating further expansion. The change from a firm to a corporation will take place on January 1 next.

AMONG THE HARDWARE TRADE.

Benedict, Warren & Co., Fayetteville, Tenn., have disposed of their Hardware stock to Hobbs, Suggs & Co. and have moved to Memphis, Tenn., where as Benedict, Warren & Davidson, Incorporated, they will carry on the wholesale Hardware business. The new company on December 1 bought out the stock of Davidson, Bagley & Co., which business will be discontinued. In the active management of the new corporation will be associated N. Benedict and R. D. Warren of the firm of Benedict, Warren & Co. and R. L. and Geo. S. Davidson of Davidson, Bagley & Co. The company will do a strictly wholesale trade and will cover with their traveling men all the territory naturally tributary to Memphis.

John E. Bassett & Co., New Haven, Conn., proprietors of the oldest Hardware store in that city, the business having been established in 1784, have materially enlarged their quarters by occupying the four-story building on State street formerly tenanted by the Butler Drug Company. This addition, aggregating more than 10,000 square feet of floor space, is needed for their growing business and also for the accommodation of new lines in the household furnishing department, such as Enameled Ware, Baskets, Wooden Ware, Brushes, &c.

The Hardware firm of Leach & Smith, Fortune, Cal., have lately bought a lot on which in the spring they expect to erect a building 60 x 100 feet. They are now handling Hardware, House Furnishing Goods, Plumbers' Supplies, Bicycles, &c., and in the new building will also take up the sale of Agricultural Implements.

Campbell & Cramer, formerly in business at Wharton, Ohio, have purchased the Hardware and Stove business of B. F. Long at North Baltimore, Ohio, which they will continue at the old stand.

The building occupied by Hardware Merchant W. L. Worsencroft at Payson, Utah, was entirely destroyed by fire a short time since. About 60 per cent. of the goods were saved.

Ben J. Schuster, Selma, Ala., has recently established a distributing point for his wholesale business in that territory at Mobile. Mr. Schuster has leased a large and commodious warehouse on the corner of St. Louis and Water streets, and from that point will ship goods to customers at places up the two rivers which are more accessible from Mobile than from Selma.

Lestoe & Sherer, Moscow, Idaho, have disposed of their stock to the Gem City Hardware Company, Limited, who will continue the wholesale and retail Shelf and Heavy Hardware, Stove and Tinware business.

H. J. Lee has disposed of his Hardware, Stove and Sporting Goods business at West Point, Neb., to Peterson & Holst.

Markey & Stouder is the style of a new firm at Fort Wayne, Ind., who have opened a store at 122 East Columbia street. The lines handled embrace Shelf and Builders' Hardware, Mechanics' Tools, Paints and Oils, &c. Jacob M. Stouder, who is the practical man of the concern, has been for 20 years past identified with the Hardware firm of Schlatter & Co.

W. T. Stout has lately commenced the Hardware and Agricultural Implement business in Erick, O. T. Mr. Stout refers to trade as in a flourishing condition and expects within a short time to build a larger store and materially increase the stock carried.

P. H. Neiheisel, Hardware dealer, at Beaver, Minn. has admitted his son to partnership and the style is now P. H. Neiheisel & Son.

J. W. D. Foote has succeeded Landreth & Foote in the Hardware and Harness business in Colby, Kan.

W. S. Price has purchased the Hardware business of L. A. Hawley in Oak, Neb.

Frank Baird & Co. are successors to Baird Bros. & Co. in the Hardware business in Bluff City, Kan.

Bradl & Madsen, Ludington, Mich., have just erected a building, 30 x 95 feet, adjoining their present store, which will be used mostly for accommodation of Wagons, Buggies, Sleighs and Agricultural Implements. They have also made an addition, 20 x 24 feet, to their present store building.

Dean & Braly have brought the Hardware, Cutlery, Crockery and Glassware stock of Rogers-Lathrop Mercantile Company at Fullerton, Cal.

J. H. Bowman has sold his retail Hardware and Farm Implement business in McLouth, Kan., to F. G. Berridge.

F. H. Blanchard, Berlin, N. H., has started a general store, handling Hardware and Building Materials in connection with groceries, &c.

L. K. Jones Hardware Company, formerly at La Belle, Mo., are putting in a stock of Hardware, Agricultural Implements and Vehicles at Thomas, O. T.

H. C. Bower has bought the Hardware, Tinware and Sporting Goods stock formerly carried by John Randolph, at Keota, Iowa, and will continue at the old stand.

MISCELLANEOUS NOTES.

Single and Extension Ladders.

The Indiana Bent Rung Ladder Company, Indiana, Pa., in addition to single, extension and sectional patent bent rung ladders, are now manufacturing a complete line of high grade straight rung, single and extension ladders. The company also make a line of step ladders.

Hammond's Window Sash Springs.

W. S. Hammond, Lewisberry, Pa., has improved the quality of his window springs for use in factories, offices, dwellings, school houses, churches, &c. The springs are now made with polished, tempered and lacquered spring steel of the best quality. All No. 2 size of springs have holes countersunk for wood screws, which can be used to better advantage to fasten the springs to windows than nails, as formerly used.

The Myers Stayon Flexible Door Hanger.

The accompanying cuts give the front, back and side views of a flexible door hanger with steel roller bearings, upon which the wheels revolve. The wheels are attached to the door by a steel strap clamped over the top of the door, extending down on each side and bolted through. The hanger is constructed so that when once in position it cannot be thrown off the track, no matter how roughly it is handled. The lug A, Fig. 2, locks over the underside of the steel rail to prevent its being thrown off. By the construction a loop joint is provided between the wheel and the top of the door, so that each

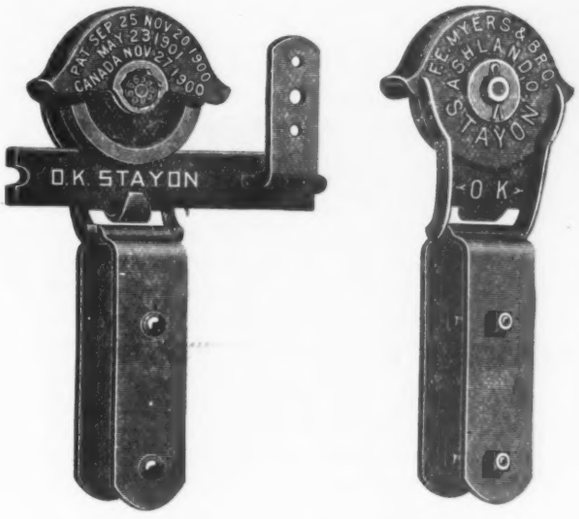


Fig. 1.—The Myers Stayon Flexible Door Hanger.

door can be swung out to an angle of 45 degrees, if desired, independent of the other door on the same track. This can be done without injury to the track or trolley. The door can be held rigid by means of a stay roller if desired. The point is made that the device is more strongly built than is usual and that the trolley wheel

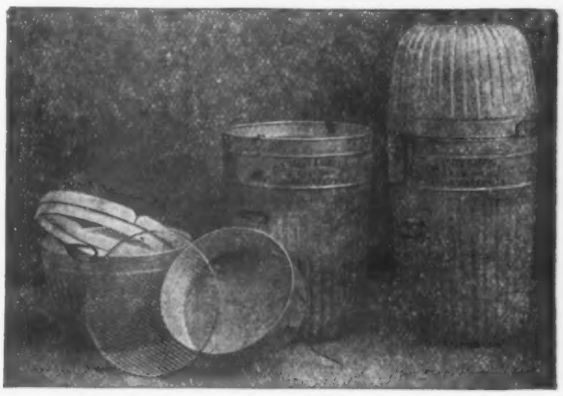
Fig. 2.—Side View of the Myers Hanger.

is covered, so that the traveler sheave cannot in any way be affected by the elements. The track is of heavy special carbon stiff steel, 3-16 x 1¼ inches, supported by a rigid bracket, with a square shoulder mortised through the track every 17 inches, to materially add to the stiffness of the track. A feature of the track is that it can be placed either side up, which is a convenience in cases where the building is not suited for placing the track as regularly intended. The hanger is put on the market by F. E. Myers & Bro., Ashland, Ohio.

R. M. Smith has succeeded M. A. Smith in the Shelf and Heavy Hardware business in Moundsville, W. Va.

A New Ash Sifter.

The ash sifter shown in the accompanying illustration is manufactured by the Steel Basket Company, Cedar Rapids, Iowa. The sifter, made from galvanized sheets, is in three parts: Ash receiver, sifting basin, with screen cover, and top or cover, with dust band around



A New Ash Sifter.

inner edge. The ash receiver will hold ashes of an average week's burning, and, like the top, is corrugated, contributing durability and strength combined with light weight. The sifter is claimed to be practically dustless, the sifting is quickly done, no rehandling of ashes being necessary, and great saving is said to be attained by its use, especially by consumers of hard coal.

The Rippley No. 7 Sprayer.

The accompanying cut represents a sprayer mounted in a standard oak barrel with heavy galvanized hoops. This is on 36-inch steel wheels, with tires 2 inches wide having round edges so as not to mark or cut the finest lawn. The sprayer is equipped with 5 feet of hose, a 6-foot extension rod, one double Vermorel nozzle and one Calla long distance spray or solid stream nozzle. The sprayer is designed to meet the wants of the city or suburban resident, for use in parks and cemeteries or any place where a team cannot be used. With this, it is explained, one can do all the spraying of a moderate sized plantation, and in addition it is an excellent implement for washing buggies, wagons, porches and outside

The Rippley No. 7 Sprayer.

windows in the first or second stories, as it will deliver a strong stream 50 to 60 feet high. It is so convenient that one man can operate it, and it can be used for painting and whitewashing factories, barns, fences, &c. It is pointed out that the valves handle these materials perfectly, and that no change is required from the most delicate spraying to the roughest whitewashing, except in nozzle caps, which are provided with every outfit, besides the cart. It is constructed so as to work perfectly on a floor or out of doors. The sprayer is offered by the Rippley Hardware Company, Grafton, Ill.

A. Young, Tulare, Cal., has sold his stock of Hardware, Stoves and Paints to the Tulare Rochdale Company. The latter have leased the building formerly occupied by J. Goldman & Co. and have refitted the interior, making an attractive emporium. This company are a co-operative concern with 65 subscribers to the stock in shares of $100 each.

Union Adjustable Scraper.

Union Mfg. Company, New Britain, Conn., and 102 Chambers street, New York, have just put on the market the Union adjustable scraper No. 90, here illustrated. This scraper is designed for scraping hard woods, par-

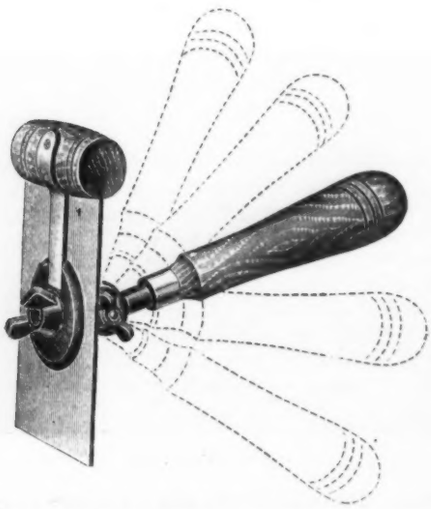


Fig. 1.—Union Adjustable Hard Wood Scraper.

ticularly parquet floors, all kinds of cabinet work, masts, spars and many other uses which will suggest themselves. It also makes a serviceable tool for butchers with which to scrape meat blocks and benches. As is

Fig. 2.—Interlocking Teeth Back of Blade, Enlarged Scale.

shown in the illustrations this scraper can be used in almost any position, a marked advantage being that the workman can both bear down and pull at the same time, the construction enabling him to get into otherwise in-

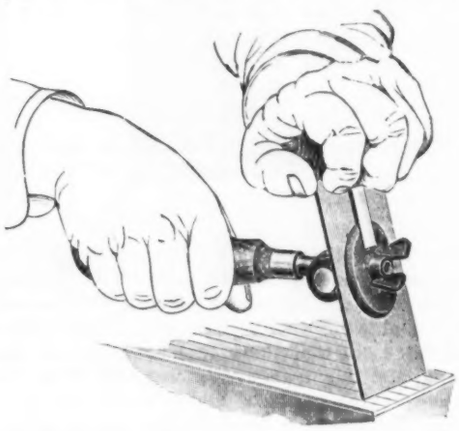
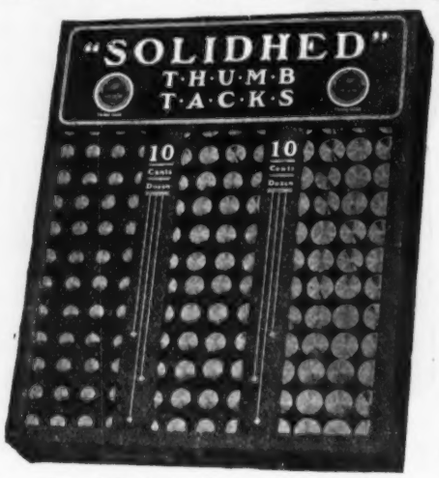


Fig. 3.—Position of Hands When Using Scraper.

accessible corners, as the handle can be swung in any position on either side vertically or horizontally. Both ends of the scraper can be used, and corners that are often inaccessible can be reached owing to the arrangement of the handles, the wood handles being instantly removable for use on either end or side. The scraper proper is 3 x 4½ inches, and is made of high grade plane blade steel, the principal handle extending 7½ inches rearward from the blade. This tool is in addition to their line of carpenters' tools, such as wood and iron planes, &c.

Solidhed Thumb Tacks in Easel Cartons.

The Hawkes-Jackson Company, 82 Duane street, New York, manufacturers of Solidhed specialties, among which are thumb tacks, paper fasteners, eyelets and pliers for eyeleting papers, fabrics, &c., have just put on the market assortment No. 2 of thumb tacks in convenient form for the retailer. The tacks include three sizes, ⅜, ½ and ⅝ inch heads, made with either rounded or beveled edges in nickeled iron, brass and German silver. As regularly put up the containers in this assortment, which have an easel back and hinged head piece to protect from shoplifters, have the three sizes of tacks with rounded edge with brass heads, but any combination of the above can be specially put



Thumb Tacks in Cartons for Retailing.

up if so desired. The containers are 10½ x 9 x 1¾ inches. Each dozen is stuck into a square of paper covered wood and the cards are three deep, there being a gross of each size in each column or 3 gross of tacks in all, which can be retailed, it is pointed out, for 10 cents a dozen at nearly 100 per cent. profit on the cost. This make of thumb tack is also made in 7-16, 9-16 and 11-16 inch heads in both brass and German silver and 7-16 inch in steel, in addition to the above.

The Columbia Acetylene Burner.

In the accompanying illustration we show the Columbia acetylene burner, made by J. B. Carroll, 36 La Salle street, Chicago, Ill. It is said to be provided with the greatest possible strength, combined with neatness of appearance, and is made so as to be regular in its di-

The Columbia Acetylene Burner.

mensions and finish. The burner proper is constructed entirely of lava and the metal pillar is finished in polished nickel. The orifices for the escape of the gas are designed to bring the jets together so as to secure great illuminating efficiency with a minimum consumption of gas. It is made in four sizes—¼, ½, ¾ and 1 foot consumption, and the size of the burner is plainly stamped on the pillar.

New Design in Builders' Hardware.

Reading Hardware Company, Reading, Pa., and 96-98 Reade street, New York, have recently brought out a group of new designs in builders' hardware for interior and exterior trim, two of the latest being here illustrated. Both are made in complete lines for front, vestibule, inside and sliding door sets, push buttons, lifts, &c.,

Fig. 1.—Gerberoy Design.

Fig. 2.—Franciscan Design.

New Designs in Builders' Hardware.

of cast bronze and in the various finishes. Fig. 1 represents the Gerberoy design of the school of Louis XV, Fig. 2 being the Franciscan and symbolical of the period of Francis I.

Corner Hanging Tool Cabinets.

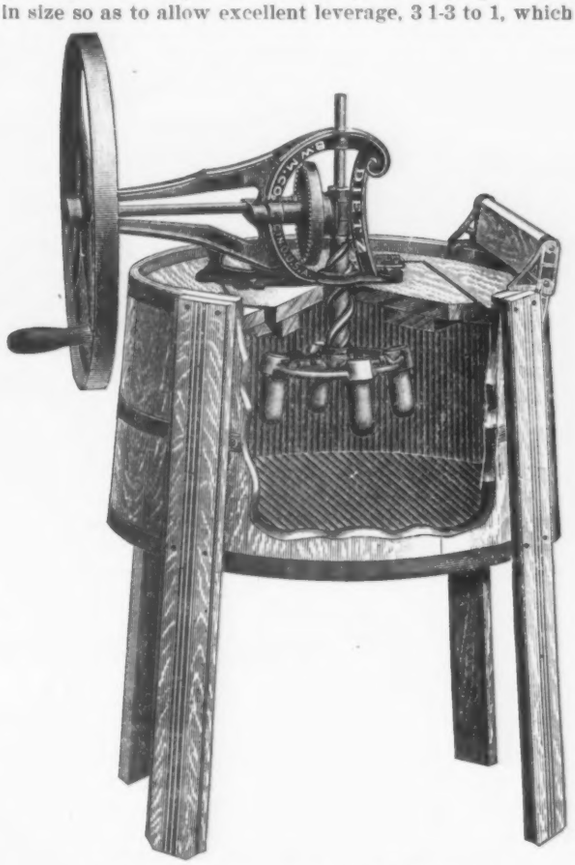
C. E. Jennings & Co., 101 Reade street, New York, have recently supplemented their extensive assortment of tool chests and tool cabinets by the addition of a

Corner Hanging Tool Cabinet.

corner tool cabinet, No. 201, complete with tools, as here illustrated. This is designed to fill a corner space instead of hanging flat against one wall as their other cabinets do. In size it is 25½ inches front width, 28¼ inches high and 17 inches deep in center, made of chestnut, natural finish. It contains a total of 34 tools, every one of which is warranted. They are packed usually two in a crate, but will be sent crated singly at a slight extra charge. Another new cabinet, so far as the assortment goes, is wall cabinet No. 100, with rectangular sides, which is 24 inches high, 16 inches wide and 5½ inches deep, containing 26 tools of the same style and quality as in similar cabinets, all warranted.

The Dietz Spiral Rotary Washing Machine.

The Boss Washing Machine Company, Cincinnati, Ohio, have put on the market the washing machine illustrated herewith. It has a compound movement, combining vertical and rotary alternate motion—that is, the pin wheel revolves alternately, and at the same time lifts and plunges the clothes upward and downward in the water to create prefect circulation or suction. All this is secured with one and three-quarter turns of the fly wheel, which can be turned either to the right or to the left. The pin wheel or dasher is made of malleable iron, heavily galvanized to prevent rust, and the wooden pins are securely fastened to the same. The gearing is entirely machine fitted, and is proportioned in size so as to allow excellent leverage, 3 1-3 to 1, which

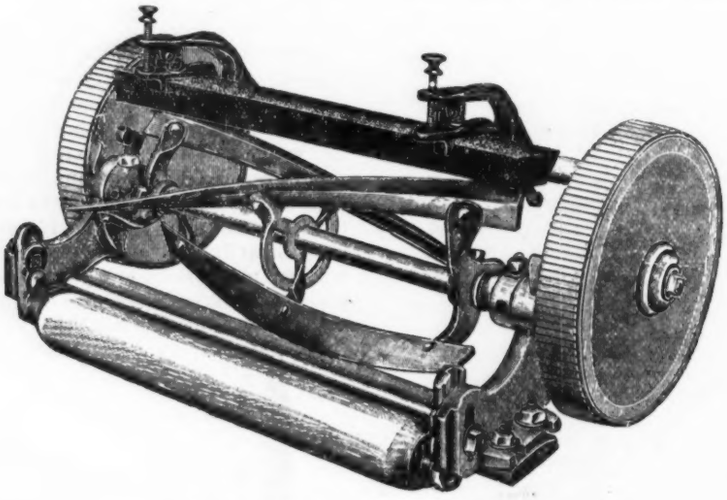


The Dietz Spiral Rotary Washing Machine.

is referred to as greatly reducing the labor required in operating the machine. It is pointed out that as the gearing does not contain any flys, dogs, clutches or triggers, it insures absolutely no breakage of castings. The tub is made of Louisiana red cypress lumber, to which are fastened four legs, each 4 inches wide, which extend to the top of the tub, and are not a part of the tub, this being referred to as an advantageous point, since the accidental breaking of a leg does not destroy the tub. The legs are solid and are not weakened by having a recess cut in to receive the bottom and head of the tub, but are held rigid by long screws fastened into the head and bottom of the tub, extending through the staves. The lid is removable by means of two detachable, nonbreakable hinges. The wringer board is attached to the tub by malleable iron fasteners, the board admitting the attachment of a 12-inch roll wringer. The manufacturers remark that the washer thoroughly and quickly cleanses the clothes, and that as there is no lost motion there is no jerking, and consequently no tearing of clothes. All iron work is finished in colored bronzes, and the machine is guaranteed to be satisfactory.

The New Star Lawn Mower Sharpener.

The New Star lawn mower sharpener shown herewith is manufactured by the Clizbe Mfg. Company, Plymouth, Ind., in lengths of 12, 14, 16 and 18 inches, to fit all mowers, and is adjustable in every way. The stone when in use is held between holders which are clamped to the front bar of the mower, and is placed so that the knives touch lightly the whole length of blades on high places and is gradually lowered by the operator as the knives are ground, so as to touch the blades evenly and lightly. Fifteen feet, it is remarked, is a sufficient distance to push the mower unless the knives are unusually dull.



The New Star Lawn Mower Sharpener.

The Klondike Sidewalk Scraper.

The sidewalk scraper herewith illustrated is offered by the Avery Stamping Company, Cleveland, Ohio. The scraper is made from high grade steel, having a first-class ash handle 4½ feet long. The point of the scraper blade is ground quite sharp to make the work of removing ice and hard snow from sidewalks as easy as possible. The blade is 6½ inches in width and 6 inches in length, beyond which a strap 4½ inches in length forms a solid hollow back socket, all in one piece, to make the tool suitable for the heaviest kind of scraping.

The Klondike Sidewalk Scraper.

Poultry or Game Shears.

Graef & Schmidt, 107 Chambers street, New York, sole agents in the United States and Canada for the diverse kinds of fine cutlery manufactured by J. A. Henckels, Solingen, Germany, are introducing an improved form of poultry or game shears, as here shown. The blades, 3½-inch cut, are curved instead of straight, and the concave or lower blade has a serrated or saw tooth instead of a plain edge, the teeth pointing rearward, which enables the user to obtain a firmer grip in cutting through bone, gristle, tendons, &c. The teeth are slightly recessed from the cutting side so that while much more efficient in operation the smoothness of the cut is not impaired. The shear is made of high grade steel, full polished and nickel plated, 9½ inches long over all, with checkered handles, volute spring and loop at handle end, to keep the blades together when not in use. This shear is made regularly entirely of steel and likewise in more expensive styles with stag and pearl handles. Importation orders are also taken for the shears with long tang ends, to be mounted in this country by the finest trade with special handles, some of which are solid silver. The shears are intended for use on the table by the host in serving game or fowl after it is cooked, by the chef or cook in the kitchen and by camping parties and sportsmen.

Poultry or Game Shears.

Articles of incorporation have been filed for the Fremont Mercantile & Implement Company, Limited, St. Anthony, Idaho. The capital stock is $100,000, fully paid up, and the incorporators are J. D. Fife, Norman Belcher, G. C. Baker, Jed Earl, A. J. Lewis, M. M. Ham mond, H. S. Jackson, T. W. Winn, Chas. De Camp and C. E. Holden. The company will carry Hardware, Farm Implements, Wagons, furniture, groceries, lumber, coal, &c., and will also operate a saw and planing mill. They will begin at once the erection of warehouses and a business block to cost about $30,000. Mr. Belcher, who will take an active part in the direction of the new company, is now in the Hardware business at Pocatello, but will remove the stock to St. Anthony during the present month.

Pierce-Whitehead Hardware Company, Weldon, N. C., have just completed a large two-story brick structure, which they will occupy with their wholesale and retail business in Hardware, Stoves, Agricultural Implements, Sporting Goods, Buggies, Wagons, Harness, Building Materials, Paints, Oils and Mill Supplies. The new store contains 10,400 square feet of floor space.